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Do More Unequal Countries Redistribute More? Does the Median Voter Hypothesis Hold?

Branko Milanovic

The data strongly support the hypothesis that countries with more unequal distribution of factor income redistribute more in favor of the poor — even when the analysis controls for older people's share in total population (that is, for pension transfers). But the evidence on the median voter hypothesis is inconclusive even if middle-income groups gain more (or lose less) through redistribution in countries where initial (factor) income distribution is more unequal

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Summary findings

The median voter hypothesis is important to endogenous growth theories because it provides the political mechanism through which voters in more unequal countries redistribute a greater proportion of income and thus (it is argued), by blunting incentives, reduce the country's growth rate.

But the hypothesis was never properly tested because of lack of data on the distribution of (pre-tax and transfer) factor income across households, and hence on the exact amount of gain by the poorest quintile or poorest half.

Milanovic tests the hypothesis using 79 observations drawn from household budget surveys from 24 democracies. The data strongly support the hypothesis that countries with more unequal distribution of factor income redistribute more in favor of the poor — even when the analysis controls for the older people's share in total population (that is, for pension transfers).

The evidence on the median voter hypothesis is much weaker.

Milanovic does find that middle-income groups gain more (or lose less) through redistribution in countries where initial (factor) income distribution is more unequal. This regularity evaporates, however, when pensions are dropped from social transfers and the focus is strictly on the more redistributive social transfers.

This paper — a product of Poverty and Human Resources, Development Research Group — is part of a larger effort in the group to study the relationship between democracy and inequality. The study was funded in part by the Bank's Research Support Budget under the research project "Democracy, Redistribution, and Inequality" (RPO 683-01). Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Patricia Sader, room MC3-556, telephone 202-473-3902, fax 202-522-1153, email address psader@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. The author may be contacted at bmilanovic@worldbank.org. December 1999. (50 pages)

COMMENTS WELCOME

Do more unequal countries redistribute more? Does the median voter hypothesis hold?

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I. Setting the problem: the link between inequality and redistribution

One of key relationships in the recent literature on inequality and growth (Perotti 1992; Perotti 1993; Persson and Tabellini 1991; Bertola 1993; Alesina and Rodrik 1994; Alesina and Perotti 1994) concerns the link between market-generated income inequality and extent of redistribution. In Perotti's (1996, pp. 151) extensive empirical review of the different theories linking growth, income distribution and democracy the relationship appears under the title of "endogenous fiscal policy approach." The fiscal policy approach includes two steps or structural equations. The first step (the political mechanism) argues that greater income inequality leads to greater redistribution and thus to more distorsionary taxation. The second step (the economic mechanism) argues that greater distorsionary taxation reduces growth. The outcome is, of course, that greater income inequality slows down growth. However, in this paper, we are concerned solely with the first step—the political mechanism.

The political mechanism works through the median voter hypothesis. According to the hypothesis, when individuals are ordered according to their factor (or market) income, [2] the median voter (=the individual with the median level of income) will be, in unequal societies, relatively poor. His income will be low in relation to mean income. If one further assumes that net transfers (government cash transfers minus direct taxes) are progressive, then the median voter has more to gain from transfers than he would pay out in taxes. Obviously, the more unequal the distribution, the more the median voter has to gain through the joint action of taxes and transfers, and the more likely is he to vote for higher taxes and transfers. [3] The more unequal societies will, therefore, select greater redistribution.

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[2] Factor income is income before government fiscal redistribution (via cash social transfers and personal income taxes). Factor (=market) income includes wages and bonuses, property income, self-employment incomed, gifts and remittances, home consumption etc. In the rest of the paper, the terms "factor" and "market" income will be used interchangeably

[3] As Alesina and Perotti (1994, p. 360) write "in the fiscal channel [explanation], the level of government expenditure and taxation is the result of a voting process in which income is a main determinant of a voter's preferences: in particular, poor voters will favor a high taxation."

This approach assumes that (1) voters' decisions on transfers and taxes are determined solely by their position in income distribution, (2) the preferences are single-peaked, and (3) all (or almost all) individuals are voters. The last point implies that the relationship between market-generated inequality and redistribution should be stronger in democracies than in authoritarian regimes where the governments can decide to ignore the preferences of the poor (see Perotti 1996, p. 171; Alesina and Perotti, 1994; Alesina and Rodrik, 1994, p. 478).

Almost no author among the many who have written on the subject empirically estimates the structural equation (the political mechanism equation). What the authors do in the empirical part is to estimate the reduced form equation where inequality in distribution of*disposable* income is used as a regressor to explain growth rate over a period of time (Persson and Tabellini 1991; Alesina and Rodrik, 1994; Alesina and Perotti 1994; Easterly and Rebelo, 1993). They do this because the data needed to estimate the structural equation are much more difficult to obtain: factor income distribution was, until recently, unavailable and if one lacks factor income distribution, one cannot calculate the extent of redistribution. Thus, neither the extent of redistribution nor the mechanism by which it occurs—the median voter hypothesis—was tested directly.

There are, however, a few exceptions. Perotti (1993 and 1996), Easterly and Rebelo (1993, p. 436), and Bassett, Burkett and Putterman (1999) estimate the structural equation of the type

(1) $T = f(Id, Z)$

where the T denotes taxes or social transfers as a share of GDP, or as in Perotti (1996) the marginal tax rate. *Id* is an index of inequality of *disposable* income, and Z other relevant variables (e.g. a democracy dummy variable, or percent of population over 65 years of age since this their larger share should imply greater transfers for pensions). Perotti's 1996 paper presents the most detailed test of the hypothesis. He finds lack of a significant relationship between the equality variable ("middle class share" defined as the combined income shares of the third and fourth quintiles of the population ranked according to*disposable* income) and marginal tax rate in various formulations: whether the share of the middle class is included

alone in the equation, or is interacted with a democracy dummy. Even in a sample of democracies alone the coefficient has the right sign but is not significant (Perotti, 1996, Table 8, p. 170). When, instead of marginal tax rate, Perotti uses, on the left-hand side, social security and welfare, or health and housing, or education expenditures (each as a share of GDP), greater inequality in disposable income is associated with greater social transfers only in the case of democracies and for social security and welfare alone. Perotti concludes (p. 172) that "...there is ... very little evidence of a negative association between equality and fiscal variables in democracies. It is true that in the political mechanism, [the variable that interacts the share of the middle class and democracy] has the expected negative sign in four cases out of six, but social security and welfare is the only type of expenditure for which it is significant." More recently, Bassett, Burkett and Putterman (1999) have reestimated these relationships using three redistribution proxies (public transfers, social security transfers, and social security and education as share of GDP), and share of the middle quintiles in *disposable* income as inequality proxy. They too find that the coefficient on the median voter either has a "wrong" sign (higher share of the middle class increases transfers) or is not statistically significant. Moreover, the results are highly unstable. Thus, in the two only direct empirical tests of the median voter hypothesis, the hypothesis is found wanting.

However, this approach is doubly unfortunate because both the left-hand side and the right-hand side variables are misspecified. On the right-hand side, there is *disposable* income inequality which is inequality *after* both taxes and transfers. However, people's voting decisions on redistribution are based on their incomes *before* redistribution.[4] It is methodologically incorrect to explain people's decision about the optimal level of taxes and transfers as dependent on the distribution which emerges as a *consequence* of that decision. This approach creates also a time-consistency problem, for in reality, people first receive their factor incomes, and then decide how much of it they are willing to redistribute through taxation and social transfers. Therefore, the methodologically correct approach is to make the decision on the extent of redistribution depend on the distribution of *market* or *factor* (*pre*-transfer and *pre*-tax) income.

[4] For example, Alesina and Rodrik (1994) are aware of that because they model a person's decision on the level of taxation on his capital/labor income ratio, that is on his factor incomes.

The dependent variable (the share of government transfers in GDP, or the marginal tax rate) is also wrong. It is not the share of GDP that matters but how redistributive the transfers and taxes are. One can easily imagine a situation where a society has large taxes and transfers whose contributors and beneficiaries are the same people. Looking at transfers' or taxes' share in GDP would give the mistaken impression that the society has chosen a lot of redistribution while the reality is exactly the opposite: redistribution may be minimal. In effect, corporatist societies of continental Europe (Austria, Germany) are often considered (see Esping-Andersen, 1990) to engage predominantly in such kinds of policies. Le Grand (1982) has similarly argued that most transfers are captured by the middle class. The essential point is that size of transfers is an imperfect indicator of the amount of redistribution. A correct approach would be to look at how much have the bottom groups of population (according to factor income) increased their share in disposable income, that is what is their income gain.

Therefore, the relationship we want to test is:

(2) $R = f(\mathrm{Im}, \mathrm{Z})$

where R = an index of redistribution, Im = an index of inequality of *factor* incomes. Equation (2) says that the extent of redistribution is a function of initial inequality with which factor income is distributed. Note that this formulation is quite flexible: voters may decide to choose small but very redistributive programs, or a series of large, but less redistributive, programs. Both may reduce initial inequality equally.

There are two hypotheses we want to test. First, that more unequal countries redistribute more; second, to look at how one possible explanation of why this may be so—the median voter hypothesis— performs. These are two distinct hypotheses. The first is a purely empirical statement. The second is a specific political mechanism.

Note that both sides of equation (2) are different from (1). This is because both sides of (1) are proxies for the "true" variables: the share of transfers in GDP or the marginal tax rate, proxy for redistribution; inequality in distribution of disposable income proxies for inequality in distribution of factor income. As mentioned before, the reason why researchers were using

equation (1) rather than (2) is because information on factor income inequality which is indispensable to calculate both sides of equations (2) is, for most countries, unavailable. In effect, the income distribution statistics that we normally have are almost without exception statistics of disposable or gross (market *plus* transfers) income. It is only recently that, thanks to Luxembourg Income Survey (LIS) data base, factor income distributions for a number of countries have become available. The LIS data enable one to observe how income distribution changes as one moves from the pure market-determined incomes to incomes that include also government cash transfers (gross income) and finally to disposable income (gross income *minus* direct personal taxes). Moreover, since almost all countries in the LIS data base are democracies, the two hypotheses can be tested precisely for the countries where they are supposed to hold the most.

The rest of the paper is organized as follows. Section II describes the data base. Section III looks at the relationship between factor income inequality and redistribution. Section IV tests the median voter hypothesis, and Section V concludes the paper.

II. Description of the data base

We use the data for 24 countries which were are, with two exceptions, democracies at the time of the surveys.[5] The following country data sets are included: Australia 1981, 1985, 1989, and 1994; Belgium 1985, 1988 and 1992; Canada 1975, 1987, 1991 and 1994; Czech Republic 1992; Denmark 1987 and 1992; Finland 1987 , 1991 and 1995; France 1979, 1981, 1984 and 1989; West Germany 1973, 1978, 1981, 1984, 1989 and 1994; Hungary 1991; Ireland 1987; Israel 1979, 1986 and 1992; Italy 1986, 1991 and 1995; Luxembourg 1985, 1991 and 1994; the Netherlands 1983, 1987, 1991 and 1994; Norway 1986, 1991 and 1995; Poland 1986, 1992, and 1995; Taiwan (Province of China) 1981, 1986, 1991 and 1995; Russia 1992 and 1995; Slovakia 1992; Spain 1980 and 1990;Sweden 1967, 1975, 1981, 1987, 1992 and 1995; Switzerland 1982; United Kingdom 1969, 1974, 1979, 1986, 1991 and 1995; United States 1974, 1979, 1986, 1991, 1994 and 1997. Most of the countries were long established democracies—with at least 20 years of uninterrupted democratic experience prior to the survey—while several had

[5] The exceptions are Poland survey in 1986 and Taiwan's surveys in 1 981 and 1986.

only a few years of democracy prior to the survey (e.g. Spain in 1980, Russia in 1992, Czech republic and Slovakia in 1992, Hungary in 1991, Taiwan in 1991). We define as established democracies (EDs) all the countries with exception of transition countries (Russia, Czech republic, Slovakia, Poland, and Hungary) and Taiwan.

As mentioned, the source of data is Luxembourg Income Survey (LIS) which, using the countries' own household income surveys,[6] tries to standardize them by making the definitions of various variables (e.g. pension income, factor income, remittances etc.) the same or as similar as possible. LIS represents the only such source of standardized individual unit record data for developed market economies. We have used all the data that LIS currently (Fall 1999) has. They came from four "waves": the first from mid-1970's and early 1980's; the second, from the second half of the 1980's; the third from the late 1980's and early 1990's; and the first from mid-1990's up to 1997.

There is thus a total of 79 country observations. For each observation, we have the average per capita income in local currency by decile, for the following six distributions:

(1) distribution of factor income (when individuals are ranked by household per capita factor income),
(2) distribution of factor income *P* which is equal to factor income (1) *plus* pension transfers (when individuals are ranked by household per capita factor income *P*),
(3) distribution of gross income (when individuals are ranked by household per capita gross income)
(4) distribution of disposable income (when individuals are ranked by household per capita disposable income)
(5) distribution of *disposable* income when individuals are ranked by household per capita *factor income.*
(6) distribution of *disposable* income when individuals are ranked by household per capita *factor income P.*

[6] The list of the exact individual country surveys used by LIS to generate its data base can be found at the website http://dpls.dacc.wisc.edu/apdu/lis_chart.html.

Factor income is defined as pre-transfer and pre-tax income. It includes wages, self-employment income, income from ownership of physical and financial capital, gifts etc.[7] Factor income P includes in addition public pensions. This is a factor income definition specially created for this study. The reason why we want to include pensions with the usual factor incomes is because pensions are a very specific transfer which does not respond to current contingencies nor whose objective is redistribution of income. Pensions, of course, are deferred wages with some redistribution component. By treating pensions as factor income, we can focus better on other social transfers (unemployment benefits, family allowances, and social assistance) whose redistributive function is undeniable.

Gross income is equal to factor income *plus* all government cash transfers. Finally, disposable income is equal to gross income *minus* direct personal taxes and mandatory employee contributions.[8]

For each type of distribution data listed above, we can easily calculate indicators of inequality as well as indexes of redistribution. For example, Tables 1a and 1b show the average Gini coefficients for the four concepts of income (factor, factor P, gross, disposable). Ginis for individual countries are shown in Annex Table 1. Each concept focuses on a different underlying cause of inequality. Factor income inequality reflects the distribution of human, physical and financial assets as well as their relative prices. This would be distribution in the absence of any government action.[9] Gross income adjusts only for government cash transfers. Finally, disposable income distribution—a statistics that is most commonly used—shows actual differences in the purchasing power between individuals. A simple example

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[7] The exact definition of factor income, using LIS notation, is as follows. Our factor income is equal to LIS-defined factor income [FI=net wage and salary income (V1) + farm self-employment income (V4) + non-farm self-employment income (V5) + cash property income (V8)] *plus* private pensions (V32) *plus* occupational public pensions (V33) *plus* alimony received (V34) *plus* other regular private income (V35) (household transfers) *plus* other cash income (V36). Our factor P income is equal to our factor income *plus* cash social security benefits for old age or survivors (V19).

[8] The exact definitions are as follows. Gross income is equal to factor income *plus* social insurance transfers (sick pay, disability pay, social retirement benefits, child or family allowances, maternity pay, military or veterans benefits, and other social insurance) *plus* social assistance transfers (means-tested cash benefits and near-cash benefits). Gross income *minus* mandatory employee contributions *minus* income tax equals disposable income. See Luxembourg Income Study variable definitions in http://lissy.ceps.lu.summary.htm.

[9] This is somewhat of a simplification because if the government were truly absent, there would be, for example, more private pensions (which are currently "crowded out" by government pensions) and the factor distribution would be different.

may show how the concepts highlight different facets of distribution. Consider Sweden and the US in the mid-1990's. In terms of disposable income inequality they are, as everybody knows, very different: the Gini for Sweden is 26, the Gini for the US much higher –actually the highest among all established democracies— 42.3 (in 1997). Yet, the two countries are almost identical in terms of factor income inequality, or in other words, in terms of underlying asset distributions: Sweden factor income Gini in the 1990's is 51-52, while the US's Gini ranges between 50 and 53.

Finally using the data from (5) and (6) [when income concept and the ranking criterion differ], we can calculate exactly the extent of gain realized by lower income groups through the operation of the government transfer and tax systems.

Table 1a. Inequality: descriptive statistics for all countries

	Mean	Standard deviation	Maximum (country)	Minimum (country)
(1) Factor income Gini	46.3	5.8	62.0 (Russia 95)	31.4 (Taiwan 86)
(2) Factor income P Gini	39.8	5.6	53.2 (Ireland 87)	30.0 (Czech 92)
(3) Gross income Gini	38.5	6.7	56.4 (Russia 1995)	24.8 (Slovakia 1992)
(4) Disposable income Gini	32.2	5.3	48.8 (Russia 1995)	20.9 (Slovakia 1992)
Reduction of inequality (1)-(4)	14.1	5.3	24.9 (Sweden 1992)	-0.5 (Taiwan 1981)
Reduction of inequality (2)-(4)	7.6	3.7	15.5 (Ireland 87)	0.3 (Italy 86)

Table 1b. Inequality: descriptive statistics for established democracies

	Mean	Standard deviation	Maximum (country)	Minimum (country)
(1) Factor income Gini	46.6	4.2	55.8 (Ireland 87)	36.4 (Finland 87)
(2) Factor income P Gini	40.2	5.0	53.2 (Ireland 87)	32.2 (Finland 87)
(3) Gross income Gini	36.9	6.1	53.8 (US 97)	28.5 (Belgium 85)
(4) Disposable income Gini	32.1	4.7	42.3 (US 97)	23.3 (Finland 97)
Reduction of inequality (1)-(4)	14.5	4.2	24.9 (Sweden 92)	7.1 (Switzerland 81)
Reduction of inequality (2)-(4)	8.1	3.3	15.5 (Ireland 87)	0.3 (Italy 86)

On average, government transfers and taxes reduce factor income inequality by more 14 Gini points (Table 1a and Table 1b). Almost a third of factor-income inequality is thus "shaved off" due to government action. Most of the reduction, 7.8 Gini points for the entire sample, or 9.7 Gini

points for the established democracies, is achieved by cash transfers, while respectively 6.3 and 7.8 Gini points reduction are due to direct personal taxes. It is also apparent that the differences between the countries' Ginis, particularly among the established democracies, are small, as we would expect from the countries which in terms of their income level, political system, and age structure of population are similar. The unweighted coefficient of variation of disposable income Gini is about 0.15—to be contrasted with the world coefficient of variation of about 0.35 (Milanovic, 1999).

Table 1b also shows that while Ireland has the highest factor income inequality among EDs, it is overtaken by the US as the country with the highest gross and disposable income inequality. At the opposite end of the spectrum, are Finland –the only West European country with the factor income Gini below 40, and the only one that comes close to Taiwan—and Sweden. Finland and Sweden have disposable income Ginis around 25. For the full sample, however, Slovakia and the Czech republic have the lowest disposable income Ginis.

Who benefits from redistribution—that is, as we move from factor to disposable income? Tables 2a and 2b show the average share gain for each of the bottom five deciles (defined according to their factor income). We define the "sharegain" as the difference between the share of a given decile of people formed according to factor income level in factor and disposable income. For example, if the bottom decile receives 2 percent of total factor income, while the same people receive 8 percent of total disposable income, the sharegain is 6 percentage points. The share of the bottom decile (formed according to factor income) increases, on average, by 5.7 percentage points in the entire sample or by 5.8 percentage points in EDs (going from respectively 0.3 and 0.2 percent of total factor income to 6 percent of disposable income). The people who are in the second decile according to factor income, gain, on average, 4.0 (the entire sample) or 4.2 (EDs only) percentage points. Their share increases from 1.9 and 1.8 percent of factor income to 5.9 or 6 percent of total disposable income. [10] The sharegain decreases with level of (factor) income, and becomes practically nil for the

[10] Note that the same disposable income share of the people who are in the bottom or the second decile according to factor income shows that, on average, is does not matter whether one is in among the bottom 10 percent or in the second decile according to factor income.

fifth decile. The combined poorest 50 percent of people according to factor incomes have a sharegain of 12.4 percentage points (in the entire sample) or 12.9 percentage points (for EDs only). The people in the upper half of factor income distribution are, of course, losers in redistribution.

Tables 3a and 3b are identical to Tables 2a and 2b except that we now look at sharegain between factor P income and disposable income. The advantage of this measure is that it allows us not to treat pensions as a redistribution transfer. The extent of redistribution is often overestimated when we look at the sharegain between factor and disposable income (as in Tables 2a and 2b). Consider the following. For many pensioners state pensions are often the only, or at least the most important, source of income. According to factor income, pensioners will tend to be ranked in lowest—often the lowest—income decile. Once we move from factor to gross and disposable income, their position dramatically improves simply because they have received a significant income source—a pension. [11] Everything else being the same, a country with many pensioners (i.e. with older population) will tend to show much larger redistribution: the sharegain will be greater. Now, if we take the view that pensions are not primarily a redistributive transfer and include them together with other factor incomes in factor P income, we can recalculate the sharegain as in Tables 3a and 3b. The extent of redistribution is halved. The sharegain goes down from more than 12 percentage points to 6 percentage points for the whole sample, 6.4 for the EDs. Note that the average sharegain is about halved for the first three deciles, it stays about the same for the fourth decile, and *increases* for the fifth decile.

[11] This is particularly noticeable for the East European countries. There pensioners have scarcely any other source of income than pensions. Factor income shows them to be very poor, and since pensions are relatively high, the sharegains are large. Similarly, factor income Gini is high. But once we include pensions with other factor incomes, the "new poor" are not nearly as poor (factor P Gini goes down a lot), and sharegains are much less.

Table 2a. Redistribution (sharegain) by decile for all countries
(from factor to disposable income)

	Average gain	Standard deviation	Maximum (country)	Minimum (country)
Bottom decile	5.7	2.4	9.9 (Slovakia 92)	0.1 (Taiwan 81 and 86)
Second decile	4.0	2.1	9.0 (Belgium 85) 8.9 (W. Germany 84)	0.1 (Taiwan 81 and 86)
Third decile	1.9	1.4	8.7 (Belgium 85) 5.1 (Sweden 92)	0.1 (Taiwan 81, 86, 91)
Fourth decile	0.7	0.6	2.8 (Sweden 95)	-0.3 (Italy 86)
Fifth decile	0.1	0.4	0.8 (Sweden 95)	-0.9 (Netherlands 94)
Bottom one-half (cumulative five deciles)	12.4	5.4	27.3 (Belgium 85) 23.5 (Poland 95)	0.3 (Taiwan 81)

Table 2b. Redistribution (sharegain) by decile for established democracies
(from factor to disposable income)

	Average gain	Standard deviation	Maximum (country)	Minimum (country)
Bottom decile	5.8	2.0	9.7 (Luxembourg 1985)	2.9 (Sweden 1967)
Second decile	4.2	2.0	9.0 (Belgium 1985) 8.9 (W. Germany 1984)	1.2 UK (1969)
Third decile	1.9	1.4	8.7 (Belgium 1985) 5.1 (Sweden 1992)	0.2 (Germany 1973)
Fourth decile	0.8	0.6	2.8 (Sweden 1995)	-0.3 (Italy 1986)
Fifth decile	0.1	0.4	0.8 (Sweden 1995)	-0.9 (Netherlands 1994)
Bottom one-half (cumulative five deciles)	12.9	4.7	27.3 (Belgium 1985) 22.5 (Sweden 1992)	5.7 (Switzerland 1982)

Note: Data for Belgium 88 and 92 show zero or almost zero income for the bottom two deciles according to factor income. If these zeros are inaccurate, redistribution may be overestimated. This is why a maximum redistribution country other than Belgium is shown as well.

Table 3a. Redistribution (sharegain) by decile for all countries
(from factor P income to disposable income)

	Average gain	Standard deviation	Maximum (country)	Minimum (country)
Bottom decile	2.8	1.8	7.8 (Spain 80)	0.1 (Taiwan 81)
Second decile	1.4	0.9	4.5 (Norway 79)	0.1 (Taiwan 81)
Third decile	0.9	0.5	2.3 (Sweden 95)	0.0 (Italy 86)
Fourth decile	0.6	0.4	1.4 (Sweden 95)	-0.2 (Germany 73)
Fifth decile	0.3	0.3	0.9 (Sweden 81)	-0.5 (Spain 80)
Bottom one-half (cumulative five deciles)	6.0	3.1	12.7 (Norway 79)	0.3 (Taiwan 81)

Table 3b. Redistribution (sharegain) by decile for established democracies
(using factor P and disposable income)

	Average gain	Standard deviation	Maximum (country)	Minimum (country)
Bottom decile	3.0	1.7	7.8 (Spain 80)	0.5 (Italy 86)
Second decile	1.5	0.9	4.5 (Norway 79)	0.1 (Italy 86)
Third decile	0.9	0.5	2.3 (Sweden 95)	0.0 (Italy 86)
Fourth decile	0.6	0.4	1.4 (Sweden 95)	-0.2 (Germany 73)
Fifth decile	0.3	0.3	0.9 (Sweden 81)	-0.5 (Spain 80)
Bottom one-half (cumulative five deciles)	6.4	2.8	12.7 (Norway 79)	0.7 (Italy 86)

Note: Deciles formed according to household per capita factor (or factor P) income.
The increase in the share shows the difference between the factor income share of people who are in the bottom (second, third etc.) decile according to factor or factor P income and their share in disposable income.

Table 4 shows extent of redistribution by country measured by the increase in the share of the people who are in the bottom quintile and bottom half of factor income distribution. (For simplicity, we shall refer to the

bottom 20 and 50 percent of the population *ranked according to factor income* as respectively "the very poor", and "the poor".) The countries are ranked by the gain in the share of the bottom half. Belgium 85 and 88, and Poland 95 shows the largest redistribution both to the lowest quintile and lowest half of the population.[12] In Poland, pensions, which have grown compared to wages since the beginning of transition, are the key reason behind heavy redistribution.[13] As expected, Sweden, Germany and France are heavily redistributionist with the bottom half gaining between 18 and 22½ percentage points (between 1 and almost 2 standard deviations above the mean), and the bottom quintile gaining between 14 and 17percentage points (more than 1 standard deviation above the mean). Redistribution is the smallest in Taiwan, Switzerland, UK in the 1970's, and the US. In the US 97, for example, the bottom half gains about 8 percentage points (almost 1 standard deviation less than the mean); in Switzerland 82, 5.7 percentage points (almost 1½ below the mean). The table displays a very unique position of Taiwan. It is of particular interest since Taiwan is the only non-Western country in the sample.[14] Taiwan has by far the lowest factor income inequality, Gini of 31 vs. the mean sample Gini of 46. But, perhaps precisely because factor-income inequality is low, redistribution is nil. Neither the poor nor the very poor gain practically anything in their disposable income share (the bottom half gains between 0.3 and 1.4 percentage points). The complete data on shares and gains by decile and by country are given in Annex Tables 2 and 3.

Table 5 shows the redistributional gain when factor income is defined to include pension transfers. Both the extent of redistribution and the rankings of recipients change. The most redistributive are the Nordic countries: among the top five countries, four are Nordic; among the top ten countries, six are Nordic.[15] Also, once we eliminate pensions, the ranking of countries that have large transfers (most of which are often pensions) like

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[12] For the reasons mentioned above (Table 2a), the Belgian data may exaggerate the extent of redistribution.

[13] This can be seen from Table 5 where the rankings are based on redistribution from factor P income: Poland 95 slips from the second most redistributionist position to the seventh.

[14] The "non -Western" means non-European, or of non-European settlement (like Australia, Canada or the U.S.).

[15] Although the concept of transfers is narrower in Table 5 than in Table 4, the sharegain (for any given data point) need not be smaller. This is because the ranking of recipients changes and these new recipients (that constitute the bottom quintile or half of the distribution) can be poorer and their ain can be greater even if the concept of transfers is more limited.

Germany, Italy and France, and which appear very strongly redistributionist according to factor income (Table 4) slips significantly. In Germany in the 1980's, the poorest quintile gained only 3 to 4 percentage points as against 14-17 percentage points when calculations are made according to factor income. Italy is shown to be among the least redistributionist countries: the bottom quintile and the bottom half gain between 1 and 2 percentage points, even if according to factor income it is more redistributionist than average.

The data in Tables 4 and 5 allows us also to see how redistribution in individual countries has evolved through time. To illustrate it, we look in Figure 1 at four countries, and focus on the most redistributionist measure: sharegain of the bottom quintile using the factor P income. We see that, while during the Thatcher period social transfers in British might have gone down as percentage of GDP, the sharegain of the very poor improved significantly. So it did in Sweden and Canada, but not in the United States where the sharegain of the very poor in 1997 was the same as quarter of a century ago, and was far smaller than in the other three countries.

Figure 1. Sharegain of the very poor, mid-1970's-mid-1990's
(using factor P income)

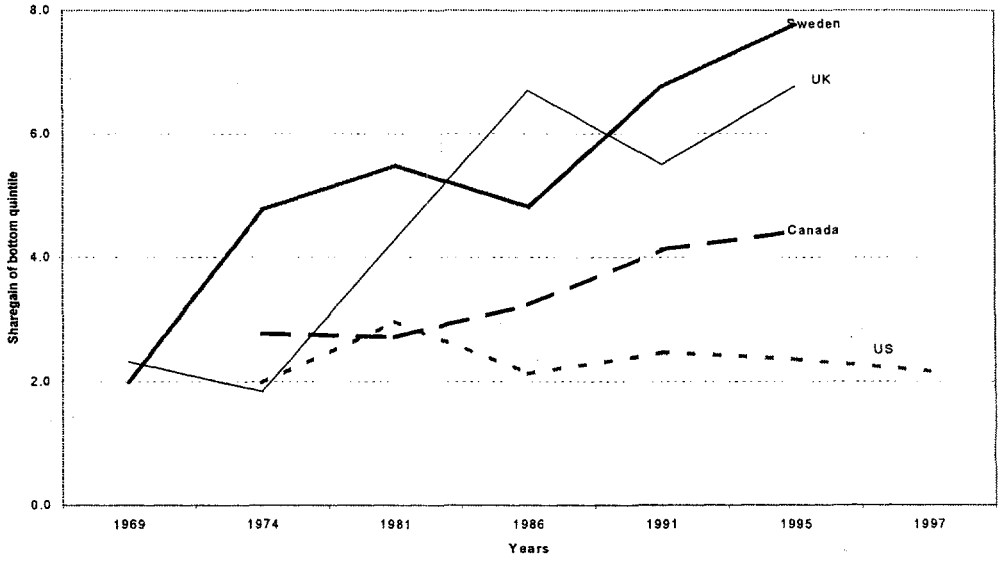

Table 4. Redistributional gain of the bottom quintile and bottom half of factor income distribution (in percentage points of disposable income)

Country (year)	Gain of the bottom quintile	Gain of the bottom half
Belgium 85	17.86	27.32
Poland 95	17.04	23.52
Belgium 88	17.15	22.88
Sweden 92	14.44	22.50
Sweden 95	13.43	21.74
Sweden 81	15.69	21.16
Sweden 87	15.55	20.44
Belgium 92	13.74	19.49
France 89	14.99	19.37
France 84	14.24	18.90
Germany 84	16.90	18.07
Slovakia 92	14.08	17.91
Germany 94	14.37	17.90
Hungary 91	12.31	17.83
Denmark 92	12.52	17.46
France 84	13.72	17.28
Czech republic 92	14.64	17.22
Denmark 87	13.72	17.05
Netherlands 87	13.87	17.05
Sweden 75	13.06	16.55
Netherlands 83	12.58	16.39
Germany 89	14.36	16.03
Luxembourg 94	14.25	15.53
UK 86	10.30	15.27
France 79	12.59	15.23
Germany 81	13.06	14.55
Italy 95	12.70	14.53
Ireland 87	9.72	14.35
Norway 95	10.73	14.27
Luxembourg 85	13.47	13.82
UK 95	8.78	13.73
Luxembourg 91	13.25	13.57
Italy 86	13.22	13.08
Italy 91	12.62	13.04
Finland 95	8.50	12.90
Norway 79	11.47	12.73
Norway 91	9.93	12.58
Poland 92	11.13	12.50
Netherlands 91	10.26	12.46
Spain 90	11.46	12.45
Germany 83	10.46	11.84

UK 91	8.24	11.78
Germany 78	10.87	11.76
Norway 86	10.19	11.35
UK 79	9.31	11.22
Australia 94	8.25	11.13
Canada 94	7.81	11.09
Russia 95	7.24	11.02
Netherlands 94	10.63	10.92
Sweden 67	7.60	10.90
Canada 91	7.07	10.01
Finland 87	7.00	9.94
Israel 92	6.21	9.69
Israel 86	6.01	9.65
Finland 91	6.60	9.64
Spain 80	9.62	9.62
Australia 89	7.66	9.60
Australia 85	7.45	9.41
Poland 86	9.86	9.33
Australia 81	7.58	9.02
US 94	5.39	8.60
Germany 73	8.76	8.44
US 91	5.33	8.43
Canada 87	6.24	8.41
Russia 92	6.43	8.28
US 97	5.25	8.18
Israel 79	5.28	8.11
US 79	5.34	8.06
US 86	4.97	7.56
US 74	5.44	7.06
Canada 81	5.13	6.75
UK 69	5.76	6.74
Canada 75	4.97	6.67
UK 74	5.36	6.27
France 81	4.58	6.00
Switzerland 82	5.24	5.70
Taiwan 95	0.92	1.37
Taiwan 91	0.42	0.65
Taiwan 86	0.23	0.43
Taiwan 81	0.16	0.34
Average	*9.75*	*12.44*
Standard deviation	*4.19*	*5.39*

Table 5. Redistributional gain of the bottom quintile and bottom half of factor P income distribution (in percentage points of disposable income)

Country (year)	Gain of the bottom quintile	Gain of the bottom half
Norway 79	11.47	12.73
Denmark 87	10.26	12.35
Sweden 95	7.77	11.89
Denmark 92	8.74	11.88
Ireland 87	8.01	11.77
Netherlands 86	10.19	11.35
Poland 95	8.07	10.64
Netherlands 87	9.10	10.58
Finland 95	6.76	10.56
UK 86	6.70	9.96
Spain 80	9.62	9.62
Sweden 92	6.76	9.58
UK 95	6.77	9.46
Sweden 81	5.47	9.11
Netherlands 83	7.34	8.86
Belgium 92	5.79	8.79
Sweden 75	4.77	8.37
Australia 94	5.89	8.31
Germany 73	8.56	8.30
Slovakia 92	5.83	8.10
Sweden 87	4.81	7.78
UK 91	5.49	7.55
Israel 92	4.60	7.42
Norway 95	5.51	7.40
Hungary 91	4.88	7.32
Finland 91	4.48	7.26
Australia 89	5.10	7.08
Finland 87	4.23	7.07
Netherlands 91	6.01	7.01
Israel 86	3.90	6.82
Canada 94	4.42	6.75
UK 79	4.29	6.55
Norway 91	4.54	6.41
Netherlands 94	6.13	6.35
Canada 91	4.12	6.35
Australia 85	4.02	6.24
Czech 92	4.13	6.11
Australia 81	4.19	5.96
France 89	3.80	5.95
Israel 79	3.34	5.94
Belgium 88	5.15	5.90
Germany 94	3.68	5.89

Belgium 85	4.83	5.80
France 84	3.13	5.58
Germany 81	3.69	5.47
France 79	3.01	5.34
Sweden 67	1.99	5.22
Canada 87	3.23	5.16
US 79	2.96	5.08
France 81	3.32	4.90
Germany 89	2.69	4.85
Germany 84	2.74	4.66
US 91	2.47	4.43
US 94	2.36	4.36
Canada 75	2.76	4.29
Canada 81	2.71	4.20
US 97	2.16	4.09
Luxembourg 94	3.21	4.04
US 86	2.13	3.94
Luxembourg 85	3.61	3.84
Germany 83	2.50	3.77
Poland 86	3.47	3.69
UK 69	2.32	3.45
US 74	1.98	3.37
Spain 90	3.07	3.33
Luxembourg 91	2.81	3.23
Germany 78	1.80	3.08
UK 74	1.84	2.93
Switzerland 82	1.28	2.07
Poland 92	1.41	1.97
Italy 95	1.60	1.85
Russia 92	0.79	1.51
Italy 91	1.05	1.16
Russia 95	0.48	0.95
Taiwan 95	0.53	0.78
Italy 86	0.59	0.67
Taiwan 91	0.30	0.54
Taiwan 86	0.21	0.41
Taiwan 81	0.14	0.32
Average	*4.25*	*6.00*
Standard deviation	*2.57*	*3.12*

III. Testing the redistribution hypothesis

As mentioned in Section I, the relationship we want to test is:

(2) $R = f(\text{Im}, \text{Z})$

We shall use two variables to capture redistribution: how the share of (i) the bottom half and of (ii) the bottom quintile (ranked by factor income) increases when we move from factor (or factor P) to disposable income—the variables just displayed in Tables 3 and 4.[16] We denote them respectively as *sharegain50* and *sharegain20.*

Our hypothesis throughout is, of course, that both *gain* variables will be positively related to factor income inequality (*Im*). Several variables can be used as indicators of factor income inequality: Gini coefficient of factor income (*Gm*); the share of the bottom half (*share50MM*); or the share of the bottom quintile (*share20MM*) where the double suffix *MM* indicate that we deal with (i) the distribution of factor (=market) income and (ii) that the recipients are ranked by their factor (=market) income.

Tables 6a and 6b shows the results of different versions of (2) for two definition of factor income. In the version using the standard definition of factor income, we control for the share of population who are over 65 years of age.[17] This is not necessary in the factor P formulation because pensions are included as part of factor P income. In each table, I combine two indicators of redistribution against three indicators of factor income inequality.

We look first at Table 6a, full-sample regressions. The coefficients indicating that greater factor inequality is associated with greater gain of the poor and the very poor have everywhere the correct sign, and are throughout significant at 1 percent level. The same holds for the age variable in Table 6a. R^2 is between 0.44 and 0.67.

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[16] Note that gain is defined across the *same* people. We do not compare the share of the bottom half ranked according to factor income to the bottom half of the distribution ranked according to disposable income.

[17] An income control (either as mean dollar income from income surveys or GDP per capita) is found statistically insignificant in all formulations.

Consider the expected gain of the poor: each Gini point increase in factor inequality is accompanied by 0.39 percentage point gain of the poor (equation 1.1). If factor income inequality rises by one standard deviation (5.8 Gini points; see Table 1a), the share of the poor in disposable income would, thanks to redistribution, increase by 2.3 percentage points, e.g. instead of getting 20 percent of disposable income, they would receive 22.3 percent. The share of the very poor would increase by 1.2 percentage points (0.205 from equation 1.2 *times* 5.9). The same results are obtained if instead of the Gini coefficient, we use the share of the bottom half of the population in market income (*Share50MM*) or *Share20MM.* The results are even stronger with the factor shares as controls (R^2 and the t-values are greater). This may be due to the fact that redistribution occurs in response to low shares of the poor or very poor in factor income, which the Gini coefficient captures only imperfectly since it reflects the entire distribution (not only the bottom of it). On average, the gain of the very poor is about one-half of the gain of the poor (the coefficient on *sharegain20* is about one-half of the coefficient on *sharegain50*). [18]

[18] This holds for equations 1 and 2; in equation 3, the relative gain of the very poor is greater (1.09 compared to 1.6).

Table 6a. Redistribution as function of factor inequality (using factor income)

	All countries		*Established democracies*	
	(1)	(2)	(3)	(4)
	Dependent variable			
Independent variables	*Sharegain50*	*Sharegain20*	*Sharegain50*	*Sharegain20*
(1) Gini for factor incomes	0.392	0.205	0.475	0.213
	(5.48)	(3.36)	(5.09)	(2.63)
Age over 65 (%)	1.11	0.93	1.24	0.98
	(6.72)	(6.56)	(7.04)	(6.43)
Constant	-20.07	-11.70	-26.03	-13.10
	(-5.71)	(-3.90)	(-5.16)	(-2.99)
R^2	0.56	0.47	0.53	0.43
(F)	(49.1)	(34.2)	(36.7)	(23.7)
(2) *Share50MM*	-0.645	-0.335	-0.761	-0.339
	(-6.27)	(-3.71)	(-5.98)	(-2.95)
Age over 65 (%)	1.04	0.892	1.18	0.958
	(6.52)	(6.33)	(7.07)	(6.34)
Constant	11.46	4.73	11.51	3.71
	(3.50)	(1.65)	(3.40)	(1.21)
R^2	0.60	0.49	0.58	0.44
(F)	(56.7)	(36.3)	(44.2)	(25.1)
(3) *Share20MM*	-1.60	-1.09	-2.00	-1.30
	(-7.97)	(-6.49)	(-7.40)	(-5.59)
Age over 65 (%)	0.77	0.668	0.99	0.824
	(4.93)	(5.00)	(6.31)	(6.12)
Constant	5.98	3.65	3.47	1.53
	(2.63)	(1.91)	(1.51)	(0.78)
R^2	0.67	0.61	0.65	0.57
(F)	(76.6)	(59.7)	(58.8)	(42.7)
Number of observations	79	79	67	67

Note: t-values between brackets. *Share50MM*=share of total factor income received by the bottom half of the population ranked by factor income. *Share20MM*=share of total factor income received by the bottom quintile of the population ranked by market income.

Table 6b. Redistribution as function of factor inequality (using factor P income)

	All countries		*Established democracies*	
	Dependent variable			
Independent variables	*Sharegain50*	*Sharegain20*	*Sharegain50*	*Sharegain20*
(1) Gini for factor incomes	0.224	0.121	0.172	0.115
	(4.28)	(2.74)	(2.60)	(1.98)
Constant	-2.99	-0.551	-0.485	-0.08
	(-1.42)	(-0.31)	(-0.18)	(-0.04)
R^2	0.19	0.09	0.09	0.06
(F)	(18.3)	(7.5)	(6.74)	(3.9)
(2) *Share50MM*	-0.385	-0.216	-0.293	-0.196
	(-4.57)	(-3.05)	(-2.87)	(-2.17)
Constant	15.16	9.44	13.47	9.19
	(7.37)	(5.45)	(5.48)	(4.26)
R^2	0.21	0.11	0.11	0.07
(F)	(20.9)	(9.3)	(8.2)	(4.7)
(3) *Share20MM*	-0.974	-0.691	-0.848	-0.70
	(-7.06)	(-5.97)	(-5.17)	(-4.82)
Constant	10.66	7.61	10.38	7.80
	(14.49)	(12.3)	(12.7)	(10.8)
R^2	0.39	0.32	0.29	0.27
(F)	(49.8)	(35.6)	(26.7)	(23.4)
Number of observations	79	79	67	67

Note: t-values between brackets. *Share50MM*=share of total factor P income received by the bottom half of the population ranked by factor income. *Share20MM*=share of total factor P income received by the bottom quintile of the population ranked by market income.

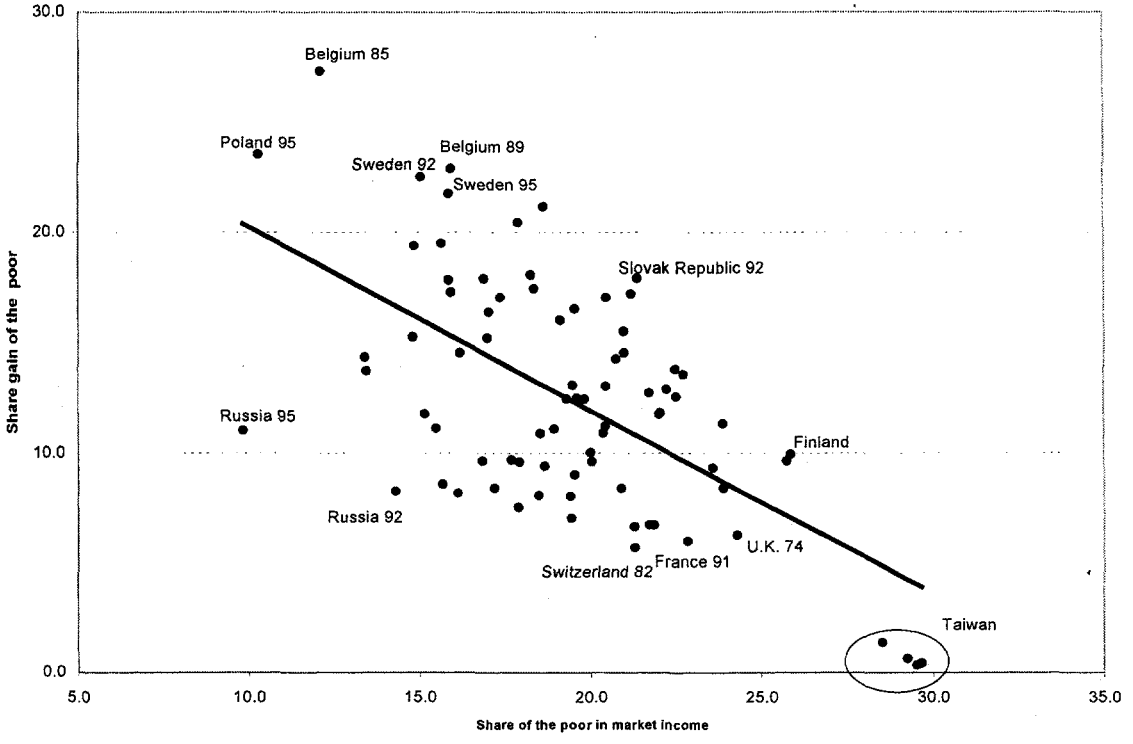
The same equations are then run over the sample of established democracies where, as mentioned before, we expect to find the redistributional regularity to hold even more strongly. All the coefficients again have the right sign and are statistically significant at 1 percent level. Each Gini point increase in factor income inequality increases the share of the poor in disposable income by 0.475 percentage points, and the share of the very poor by 0.213 points. The coefficients on *sharegain50* and *sharegain20* are greater, in absolute amounts, than in the full–sample regressions. Thus, for example, a percentage point decrease in the factor-income share of the poor (*Share50MM*) increases the poor's share in disposable income by 0.76 points in established democracies and 0.65 points in the full sample (equations 2.1 and 2.3). The fact that the coefficients in equations 2 and 3 are less than unity indicates that redistribution does not fully compensate for the initially lower share of the bottom half. In other words, the poor in a country with lower factor income share of the poor (by 1 percentage point) would still end up with a disposable income share that is less, on average, by 0.24 percentage points (in EDs) or 0.35 points (in full sample) than the poor in a more factor-equal country.

This is not the case for the very poor. The redistribution coefficients in equations 3.2 and 3.4 are throughout greater than 1. For the very poor, in effect, redistribution *more than compensates* for their initially lower factor share. Thus, each percent point drop in their factor income share *increases* the poor's share in disposable income by 1.3 percentage points (in established democracies) and 1.09 percentage points in established democracies. Ironically, the poor are eventually better off if they start worse off!

In Table 6b, I run the same regressions as in Table 6a except that factor income is now replaced by factor P income. *age65* is no longer needed as control variable. The redistribution coefficients have again the right sign and are but one are highly significant. However, the R^2 are significantly lower. They increase though as we move from equations 1 (factor Gini as control) to equations 3 (*share20MM* as control). Once pensions are not part of social transfers, the redistribution that we capture concerns transfers directed to the very poor. These transfers therefore explain much better what happens to the very poor, as in equation 3. They matter much less for the rest of the population.

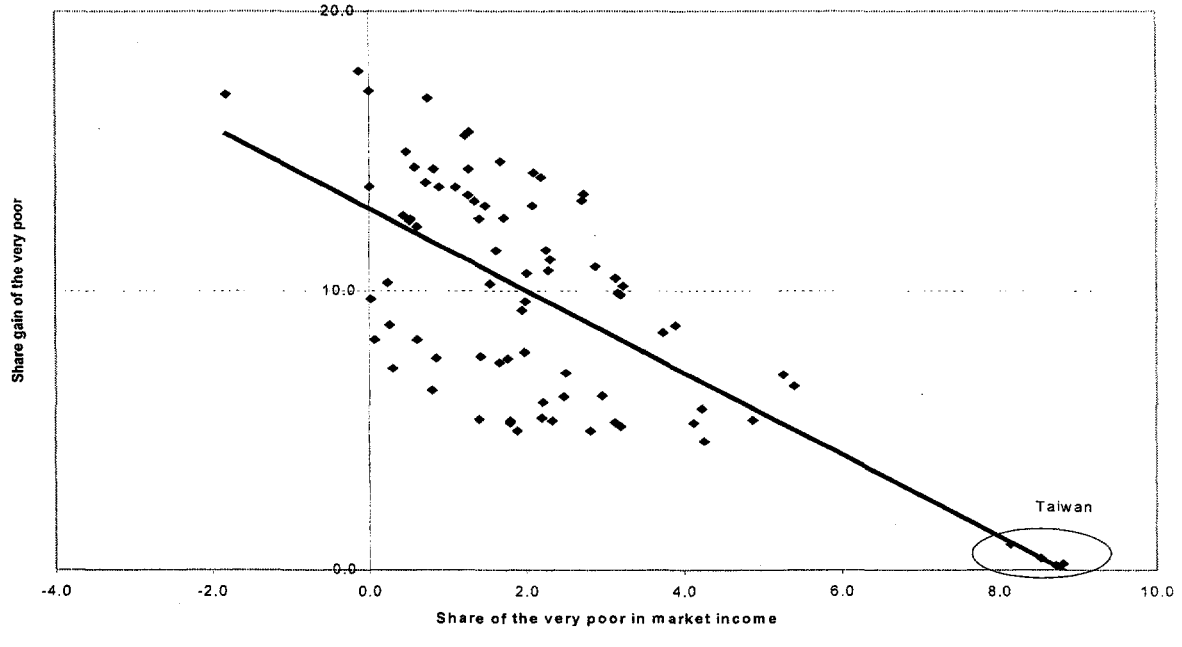
The most interesting regressions are 2.1 and 2.3 for the poor, and 3.2 and 3.4 for the very poor. The poor's gain is now half of what it was in earlier regressions when pensions were not part of factor income. For the full sample, the redistribution coefficient goes down, in absolute value, from 0.64 to 0.38 (equation 2.1). Similarly, for the very poor, the redistribution coefficient decreases from 1.09 to 0.69 (equation 3.2). Clearly, lots of redistribution simply occurs as result of pension payments. However, there is more than that. It is not simply that once pensions are included as part of factor income that total transfers (and redistribution) are less. There is also a re-ranking effect. By not considering pensions as part of factor income we treat many households who depend on pensions for the large part of their income as poor or very poor. However, once pensions are included in factor income, many of such households are no longer poor. Thus, with factor P definition, not only is redistribution, by definition, less but both the poor and very poor households are different. And transfers shorn of pensions capture much better what happens among the "new poor" (not pensioners) than among the others.

Figure 2. The poors' gain as function of their share in factor income



Note: Share gain of the poor is the difference between the share of the bottom half of the population in disposable income and factor income. The bottom half of the population are the 50 percent of the people with the lowest per capita factor income.

Figure 3. The very poors' gain as function of their share in factor income



How large is redistribution? We have seen that societies that start with a more unequal distribution of factor income are likely to exhibit greater redistribution. That gain is less—although it persists—when we move from standard definition of factor income to the one that includes pension transfers. Now, the question can be asked, Will redistribution be so large that the share of the poor will be independent, in terms of disposable income, of their starting position?

Results in Table 7 test the extent of the gain. The share of disposable income received by the poor, *Share50DM*, is positively related to their share in factor income whether we use the standard definition of factor income, or factor P income (see equations 1 and 3). Each percentage point increase in their "starting position", raises their share in disposable income by 0.355 (if we use factor income) or 0.615 percentage points (if we use factor P income). The situation is less clear cut when we look at the very poor. Their share in disposable income does *not* depend on how much they receive in the form of factor income (note the very small and statistically not significant coefficient in equation 2), but is positively related to their share in factor P income (equation 4).

Although the final position of the poor and the very poor does depend on what their initial share in factor and factor P income is, redistribution significantly reduces the differences which might exist between the countries at the factor income level. This is reflected in the fact that the coefficients associated with *Share50MM* and *Share20MM* are less than unity. Redistribution is therefore greater in societies that start by being more unequal, but is not so great as to make the position of the poor and the very poor independent of what their initial shares are.

Figure 4 illustrated this on the example of disposable and factor income Ginis. The difference between the two Ginis increases in factor income Gini: in other words, redistribution increases in factor Gini, but the slope of the line AA is still positive—indicating that greater factor inequality still results, on average, in higher disposable income inequality.

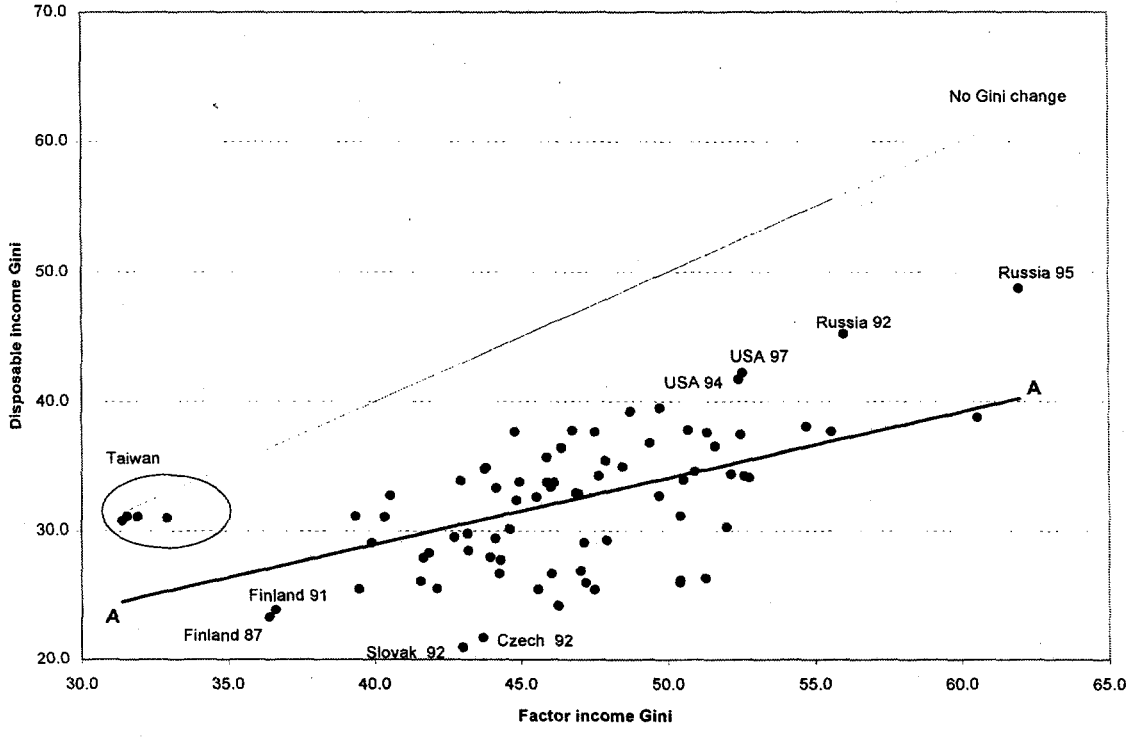
Table 7. Extent of redistribution

	Using factor income		Using factor P income	
	(1) *Share50DM*	(2) *Share20DM*	(3) *Share50DM*	(4) *Share20DM*
Share50MM	0.355		0.615	
	(3.45)		(7.30)	
Share20MM		-0.009		0.309
		(-0.56)		(2.67)
Age over 65 (in %)	1.05	0.657		
	(6.52)	(4.89)		
Constant	11.46	3.65	15.16	7.61
	(3.50)	(1.91)	(7.32)	(12.3)
R^2	0.37	0.31	0.41	0.08
(F)	(22.7)	(17.3)	(53.4)	(7.12)
Number of observations	79	79	79	79

Note: t-values between brackets.

Share50DM=share of total disposable income received by the bottom half of the population ranked by factor (market) income. *Share50MM*=share of total market income received by the bottom half of the population ranked by factor (market) income.

Figure 4. Reduction in inequality (Gini) as a function of initial factor inequality



IV. Testing the median voter hypothesis

Our conclusions so far suggest a process of redistribution that is positively associated with initial inequality in factor incomes. This is simply an empirical finding. The problem is to find an economic explanation why such a particular redistribution would occur. The median voter hypothesis provides one possible explanation. The median voter hypothesis, in its most abstract version, posits that, if preferences are single-peaked, the median voter will decisively determine the level of redistribution, by selecting the tax rate and thus the amount of transfers (taxes are equal to transfers) that is optimal for him. Since it assumes that the tax rate is increasing in income, and transfers are flat, the poorer the median voter relative to the mean (or more generally, the lower his position in income distribution), the greater the incentive to vote for higher taxes, and thus for higher transfers.

It is important to be very clear what the hypothesis says. First, it says that the median voter must gain from the process of redistribution: the transfers he receives must be greater than taxes he pays, for otherwise the optimal tax rate for him would be zero (Corollary 1). Second, it does*not* say that the median voter will necessarily gain more than any other: the very poor would, by definition, gain more than the median voter because they would receive the same amount of transfers, but will pay less in taxes (Corollary 2). Third, it says that the poorer, in relative terms the median voter, the larger his gain (Corollary 3). We shall look at how each of the three corollaries performs.

Let the median voter be the one belonging to the fifth and sixth decile of factor income distribution. We have already seen that *sharegain* of the fifth decile (and even more so of the sixth decile) is negative, regardless of what factor income definition we use. The same is true of their absolute (dollar or local currency) gain. Table 8 illustrates this fact: it shows that, with standard definition of factor income, the fifth decile on average loses through redistribution 3.6 percent of its disposable income, and the sixth decile almost 10 percent. Both are thus, on average, net tax payers. Out of 68 countries,[19] the fifth deciles is a net tax payer in 49 countries, while it gains

[19] For some countries the data on gross income (and thus on transfers) are not available, which causes the decrease in the sample size.

in 19; [20] the sixth decile is a net tax payer in 54 countries, and gains in only 14. A typical relationship between cash transfers and taxes is shown in Figures 4a and 4b. The bottom three deciles gain; everybody else loses. Therefore, our Corollary 1 does not seem to hold: the median voter would be better off with a zero tax rate. However, this conclusion is not fully warranted because our data take into account cash transfers only. Overall cash transfers in our data base are in most cases (58 out of 68) less than taxes. [21] On average, direct taxes are 1.6 times greater than cash transfers (Table 8). For example, in the case of the Netherlands and the US shown in Figure 4 the tax-to-transfer ratio is respectively 1.8 and 2.5. If we added to cash transfers also transfers in kind (health, education, public administration etc.) which too are financed out of taxes, overall transfers would increase and it is quite likely that, under some reasonable apportioning of benefits from transfers in kind, the median voter may come out as net beneficiary. Still our data base does not allow us to test this hypothesis. We thus have to move to a weaker formulation of the median voter hypothesis, that is to test the Corollary 3.[22]

Table 8. Net tax as percentage of disposable income

	Average	Standard deviation	Minimum (country)	Maximum (country)
Fifth decile	3.6	13.6	-43.1 (Poland 95)	33.2 (Netherlands 94)
Sixth decile	9.8	12.9	-32.9 (Poland 95)	36.2 (Netherlands 94)
Average	5.7	13.1	-36.5 (Poland 95)	28.2 (Israel 79)
Memo: Tax-transfer ratio	1.6	0.7	0.2 (Russia 92)	3.4 (UK 74)

Note: Deciles formed according to household per capita factor income.

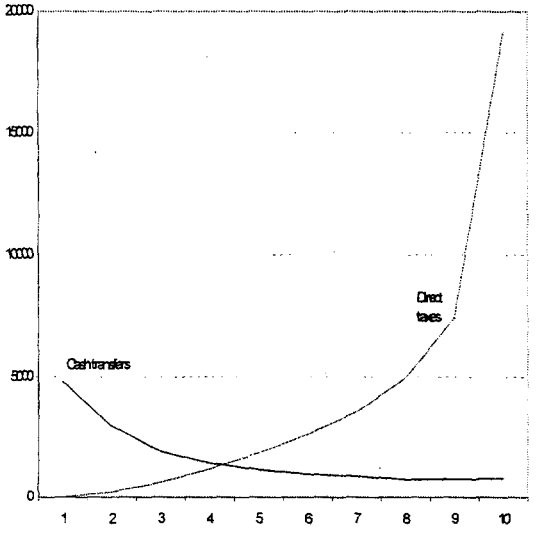
[20] The countries where the net taxes of the fifth decile are negative (as the theory would predict it) are an interesting group: Sweden in 1992 and 1995, Russia in 1992, Taiwan in 1991 and 1994, Ireland in 1987, Israel in 1992, Italy in 1986, Luxembourg in 1986, France in 1979, 1981, 1984 and 1989, and Czech republic in 1992.

[21] Note that taxes include both mandatory employee contributions and direct taxes.

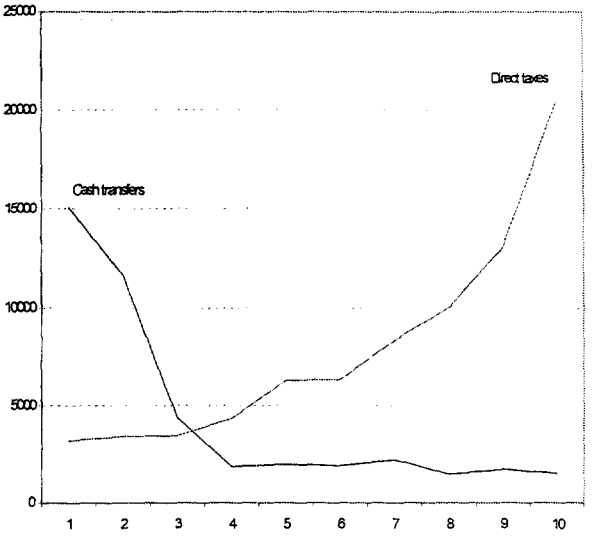
[22] The Corollary 2 is satisfied in all cases (see Annex Tables 2 and 3).

Table 4. Cash transfers and direct taxes by decile
(deciles formed according to factor income)

United States 1997



The Netherlands 1994



Note: Amounts on the vertical axis in local currency.

We test Corollary 3 by looking at the relationship between R, the sharegain of the middle class (fifth and sixth decile according to factor income), and μ the position of the median voter (at the factor income level), and other variables Z.

$$(2) \qquad R = f(\mu, Z)$$

Similar to the *sharegain* definitions above, we define the sharegain of the middle class as the change in the percentage of total income received by the fifth and sixth decile as one moves from factor to disposable income (*sharegain5060*). μ is alternatively defined as factor income share of the middle class (*Share5060MM*), and median income expressed as percentage of mean income. In both formulations, we expect that an improvement in the relative position of the middle class in distribution of*factor* income will reduce its sharegain. The regressions are conducted for both definitions of factor income (factor income and factor P income).

The variable *sharegain5060* is in *all* cases negative (see Annex Table 6). The mean *sharegain5060* is minus 6 percentage points, and the range is

from –12.1 (Belgium 1985) to –1.3 (Sweden 1995). The situation is the same if sharegain is defined with respect to factor P income. The mean *sharegain5060* is then minus 4.5 percentage points and the range is from -14.5 to -1.1. But we expect that the *sharegain* will be greater in countries where the position of the middle class, before taxes and transfers "kick in", is worse. Table 9 gives the results. They show that each percentage point decrease in the factor income share of the middle class is associated with a 0.2 to 0.3 point increase in middle class sharegain. The coefficient is significant at 1 percent level in all formulations except in the case of EDs and factor P income. However, the R^2's are much lower than in the test of the redistribution hypothesis. The fact that the coefficient is less than 1 implies that redistribution does not fully "compensate" the middle class in a more unequal country for its lower factor income share.

Regressions 2.1 and 2.2 (Table 9) tests the same hypothesis using the mean-to-median ratio as a proxy for the position of the middle class at the factor income level. With factor income, we see that a 10 percent increase in the ratio—that is a less favorable position of the middle class—rises the sharegain of the middle class by 6 percentage points (for the entire sample) and 10 percentage points (for established democracies). When we use factor P income, the coefficient ceases to be statistically significant and R^2 becomes practically zero. This means that once we eliminate pensions from cash transfers, the middle classes' gain or loss in redistribution is independent from the initial (factor) distribution. It is explained by the fact that middle classes receive little in the form of non-pension cash transfers such as unemployment benefits, social assistance and even family allowances. Thus, the median voter hypothesis fails when we focus on the truly redistributive transfers only.

Table 9. Middle class gain as function of initial position of the median voter

	Using factor income		Using factor P income	
	All sample	Established democracies	All sample	Established democracies
Independent variables	*Sharegain5060*	*Sharegain5060*	*Sharegain5060*	*Sharegain5060*
(1) Middle class share (*share5060MM*)	-0.208 (-2.67)	-0.297 (-2.85)	-0.252 (-3.78)	-0.063 (-0.73)
Age over 65 (%)	-0.081 (-1.0)	-0.011 (-0.10)		
Constant	3.57 (1.14)	6.25 (1.58)	5.98 (2.14)	-1.71 (-0.47)
R^2 (F)	0.12 (6.40)	0.14 (5.0)	0.16 (14.2)	0.01 (0.5)
(2) Mean-to-median ratio (in %)	6.02 (2.52)	10.05 (2.93)	2.47 (0.82)	1.93 (0.66)
Age over 65 (%)	-0.086 (-1.03)	-0.008 (0.94)		
Constant	-12.26 (-3.65)	-18.27 (-3.7)	-7.51 (-2.1)	-6.64 (-1.9)
R^2 (F)	0.11 (4.6)	0.14 (5.2)	0.01 (0.7)	0.01 (0.4)
Number of observations	79	67	79	67

Note: t-values between brackets. *Share5060MM*=share of total factor income received by the fifth and sixth decile of the population ranked by factor income (=middle class). *Sharegain5060*=middle class gain as one moves from factor to disposable income.

V. Conclusions

The purpose of the paper was to twofold: to test the hypothesis of inverse relationship between inequality in distribution of factor income and redistribution, and one possible political channel of redistribution: the median voter hypothesis.

The paper's approach is new in the sense that for the first time both the dependent and the independent variable in the redistribution and the median voter hypotheses are correctly specified. The dependent variable is the extent of redistribution—income share gain of the lower half of income distribution according to factor income ('the poor"), or of the bottom quintile ("the very poor"), or the middle class (fifth and sixth decile). The independent variable is level of inequality of factor income or position of the middle class in factor income distribution. Neither of these two variables were used in previous work because they are not easily available. The hypothesis is tested on the sample of 24 countries, with a total of 79 observations.

We find strong support for the redistribution hypothesis. More unequal factor-income countries redistribute more toward the poor and very poor. Consider a country A that has exactly the mean characteristics of our sample. Its factor Gini coefficient would be 46.3, and the bottom half of its population ("the poor"), would receive 19.4 percent of total factor income. When we move to disposable income distribution, that is include all government cash transfers and personal taxes, the country would have a Gini of 32.2, and the *same people* will have increased their share to 32.1 percent of total disposable income. The poor will have therefore gained a 12.7 percentage points share. Now, if we consider another country B, equal in all respects to A except that its factor income inequality is higher by 1 Gini point. The poor's gain in country B would reach 13.3 percentage points, i.e. the sharegain would be 0.65 percentage points greater. Although the redistribution would have gone far toward equalizing the position of the poor in the two countries, it would have still left the disposable-income position of the poor in country B worse than in A, because the sharegain is less than unity. For the very poor (the bottom quintile), however, redistribution is sufficiently strong to render their position in terms of disposable income share independent of their starting position (factor-income share).

The effects of redistribution become much more muted once pensions are taken out of transfers and treated as factor income. The negative sign between the poor's share in factor income and sharegain persists, and the coefficient remains statistically highly significant throughout, but is much smaller. It is about ½ of the previous size: between 0.3-0.4 rather than 0.6-0.7.

Unlike the evidence on the link between the extent of pro-poor redistribution, and factor income inequality, the evidence that redistribution takes place through the median voter channel is much weaker. Our data—based on cash transfers—do not allow us to determine that the middle class is a net beneficiary of redistribution. Moreover, comparing cash transfers and taxes only, the middle income groups appear always to be losers. However, it is likely that, if one included transfers in kind, the middle classes may turn out to be net beneficiaries. Testing a weaker formulation of the median voter hypothesis—namely that lower factor income share of the middle class is associated with their greater sharegain—we find that it holds so long as pensions are included among cash transfers. Once we exclude them, there is no evidence that the middle classes that start from a less favorable factor income position do redistribute more in their own favor.

The median voter hypothesis fails once we focus on the truly redistributive transfers from which the middle classes *contemporaneously* gain little. This leaves us with three possible explanations. First, since those poorer than the middle classes contemporaneously gain, is the decisive voter at a level income lower than the median? This looks implausible since the recent work, if anything, has moved in the direction of finding the decisive voter at a level higher than the median (see Bassett, Burkett and Putterman, 1999).

Second, lack of contemporaneous middle-class gain may mask a long-run middle-class gain from redistributive programs. Those currently in the middle class will not profit from current unemployment transfers. But they may be willing to finance them because they expect to receive them if they lose their jobs.

Third, a totally different political mechanism to explain redistribution may have to be defined.

REFERENCES

Alesina, Alberto and Dani Rodrik (1994), "Distributive Politics and Economic Growth", *Quarterly Journal of Economics*, vol.109: May, pp. 465-90.

Alesina, Alberto and Perotti, Roberto (1994), "The Political Economy of Growth: A Critical Survey of the Recent Literature", *The World Bank Economic Review*, vol. 8, No.3, pp. 350-371.

Bassett, William F., John P. Burkett, and Louis Putterman (1999), "Income Distribution, Government Transfers, and the Problem of Unequal Influence", *European Journal of Political Economy*, vol. 15, pp. 207-228.

Bertola, Giuseppe (1993), "Factor Shares and Savings in Endogeneous Growth", *American Economic Review*, vol. 83, No.5, pp. 1184-1198.

Easterly, William and Sergio Rebelo (1993), "Fiscal Policy and Economic Growth: an Empirical Investigation", *Journal of Monetary Economics*, vol. 32, No. 3, December, pp. 417-458.

Esping-Andersen, Gosta (1990), *The three worlds of welfare capitalism*, Princeton, N.J. : Princeton University Press.

Le Grand, Julian (1982), *The Strategy of Equality: Redistribution and the Social Services*, London: Allen and Unwin.

Milanovic, Branko (fothcoming), "World Income Distribution in 1988 and 1993", mimeo.

Perotti, Roberto (1992), "Income Distribution, Politics and Growth", *American Economic Review*, May, pp. 311-316.

Perotti, Roberto (1993), "Political equilibrium, income distribution, and growth", *Review of Economic Studies*, vol. 60:755-76 October.

Perotti, Roberto (1996), "Growth, Income Distribution, and Democracy: What the Data Say", *Journal of Economic Growth*, vol.1, June, pp. 149-187.

Persson, Torsten and Guido Tabellini (1991), "Is inequality harmful for growth? Theory and evidence", National Bureau of Economic Research. Working paper series, No. 3599, January.

Persson, Torsten and Guido Tabellini (1994), "Is inequality harmful for growth? Theory and evidence", *American Economic Review*, vol. 84, pp. 600-621.

Persson, Torsten and Guido Tabellini (1992), "Growth, Distribution and Politics", *European Economic Review*, vol. 36. 593-602.

Annex Table 1. Gini coefficients					
	Factor income	Factor P income	Gross income	Disposable income	(4)-(1)
Australia 81	46.0	41.9	37.7	33.4	-12.6
85	47.7	43.4	39.3	34.3	-13.4
89	48.5	45.1	39.7	35.0	-13.5
94	51.6	48.1	41.0	36.6	-15.1
Belgium 85	54.6	34.0	26.7	26.7	-27.8
88	50.0	34.4	26.9	26.9	-23.1
92	50.4	38.0	31.8	26.0	-24.4
Canada 75	43.8	40.8	37.2	34.8	-9.0
81	42.9	39.8	36.5	33.9	-9.1
87	44.2	40.4	36.6	33.3	-10.8
91	45.5	41.5	36.4	32.6	-12.9
94	47.0	42.2	36.9	32.9	-14.1
Czech Republic 92	43.7	30.0	24.0	21.7	-22.0
Denmark 87	44.3	38.0	30.7	27.8	-16.5
92	47.2	40.3	30.5	26.0	-21.2
Finland 87	36.4	32.5	28.5	23.3	-13.1
91	36.6	33.5	28.5	23.9	-12.7
95	42.1	39.2	30.2	25.5	-16.6
France 79	50.9	42.8	38.1	34.6	-16.3
81	40.5	39.3		32.7	-7.8
84	52.2	42.8	37.9	34.4	-17.8
France (b) 89	52.8	42.1	35.9	34.2	-18.6
W. Germany 73	40.3	40.2	32.5	31.1	-9.3
78	43.2	33.9	32.1	29.8	-13.4
81	44.1	34.8	31.4	29.4	-14.7
83	42.7	34.2	31.7	29.5	-13.2
84	47.9	35.5	33.1	29.3	-18.6
89	47.2	35.7	33.8	29.1	-18.0
94	50.4	39.4	35.9	31.2	-19.3
Hungary 91	52.0	39.2	30.3	30.3	-21.7
Ireland 87	55.6	53.2	41.7	37.7	-17.9
Israel 79	47.5	45.0	41.9	37.7	-9.9
86	50.7	47.7	43.2	37.8	-12.9
92	49.4	46.8	41.4	36.8	-12.6
Italy 86	46.1	34.0		33.7	-12.4
91	44.9	33.7	32.4	32.4	-12.5
95	51.3	39.8	37.6	37.6	-13.7
Luxembourg 85	41.7	32.6		27.9	-13.8
91	41.9	32.2	28.3	28.3	-13.6
94	44.0	33.1	28.0	28.0	-16.0
Netherlands 83	50.5	44.7	36.8	34.0	-16.6

87	49.7	44.3	35.6	32.7	-17.0
91	46.9	41.4	34.1	32.9	-13.9
94	45.0	40.0	34.0	33.8	-11.2
Norway 79	43.2	43.2	32.6	28.5	-14.7
86	39.5	39.5	29.0	25.5	-14.0
91	41.6	34.4	30.0	26.1	-15.5
95	44.3	36.5	30.5	26.7	-17.5
Poland 86	39.9	33.5		29.1	-10.8
92	45.9	36.3	33.8	33.8	-12.1
95	60.6	50.9	38.7	38.8	-21.7
ROC Taiwan 81	31.6	31.6	31.5	31.1	-0.5
86	31.4	31.4	31.3	30.8	-0.6
91	31.9	31.8	31.6	31.0	-0.9
95	32.9	32.1	31.4	31.0	-2.0
Russia 92	56.0	47.2	45.4	45.2	-10.8
95	62.0	50.0	48.8	48.8	-13.2
Slovak Republic 92	43.0	32.0	23.0	20.9	-22.1
Spain 80	45.9	45.9	35.7	35.7	-10.2
90	46.0	37.4	33.7	33.7	-12.4
Sweden 67	47.9	42.5	40.3	35.4	-12.4
75	45.6	35.6	31.1	25.5	-20.1
81	46.3	33.7	28.2	24.2	-22.0
87	47.5	34.1	29.2	25.5	-22.0
92	51.3	38.2	29.5	26.4	-24.9
95	50.4	40.5	29.9	26.2	-24.2
Switzerland 82	44.8	40.1	39.2	37.7	-7.1
U.K. 69	43.8	40.0	37.6	34.9	-8.9
74	39.3	34.9	33.8	31.1	-8.2
79	44.6	38.5	33.0	30.1	-14.5
86	52.6	46.6	37.5	34.3	-18.3
91	52.5	47.6	40.4	37.5	-15.0
95	54.7	50.0	41.2	38.1	-16.6
U.S.A. 74	46.8	42.7	41.1	37.8	-9.0
79	46.4	43.4	40.7	36.4	-9.9
86	48.7	45.0	43.1	39.2	-9.5
91	49.7	45.8	43.4	39.5	-10.2
94	52.4	48.3	45.9	41.7	-10.7
97	52.6	48.4	46.4	42.2	-10.3
Mean	46.4	39.8	35.0	32.2	-14.2
St. Deviation	5.9	5.6	5.5	5.3	5.5

Note: Gini coefficients calculated on per capita basis.

Annex Table 2						
	GAIN IN SHARES (in percent; using factor income)					
Countries, years	first	Second	third	Fourth	fifth	Five deciles (cumul)
Australia 81	4.5	3.1	1.0	0.4	0.1	9.0
85	4.2	3.3	1.2	0.6	0.2	9.4
89	4.2	3.5	1.3	0.5	0.2	9.6
94	4.0	4.2	2.0	0.7	0.2	11.1
Belgium 85	8.8	9.0	8.7	1.5	-0.8	27.3
88	8.6	8.5	3.7	2.3	-0.3	22.9
92	8.9	4.8	4.4	1.2	0.1	19.5
Canada 75	3.3	1.7	1.0	0.5	0.2	6.7
81	3.5	1.7	1.0	0.5	0.2	6.8
87	4.1	2.2	1.3	0.7	0.2	8.4
91	4.4	2.7	1.7	0.9	0.3	10.0
94	4.8	3.0	1.9	1.0	0.4	11.1
Czech Republic 92	9.2	5.4	2.0	0.7	-0.2	17.2
Denmark 87	8.0	5.7	2.9	0.8	-0.4	17.1
92	6.6	6.0	3.3	1.5	0.1	17.5
Finland 87	4.4	2.6	1.6	0.9	0.4	9.9
91	4.1	2.5	1.6	1.0	0.4	9.6
95	5.1	3.4	2.2	1.5	0.8	12.9
France 79	8.5	4.1	1.5	0.8	0.3	15.2
81	3.3	1.2	0.8	0.4	0.2	6.0
84	8.0	5.7	2.1	1.0	0.4	17.3
France (b) 89	7.8	7.2	2.9	1.3	0.2	19.4
W. Germany 73	6.0	2.8	0.2	-0.2	-0.4	8.4
78	6.2	4.7	1.0	0.1	-0.3	11.8
81	8.7	4.4	1.3	0.6	-0.4	14.6
83	6.0	4.5	1.3	0.3	-0.2	11.8
84	8.0	8.9	1.6	0.0	-0.4	18.1
89	7.7	6.6	1.8	0.2	-0.3	16.0
94	7.9	6.4	2.7	0.9	0.0	17.9
Hungary 91	7.0	5.3	3.0	1.8	0.7	17.8
Ireland 87	4.9	4.8	3.0	1.3	0.4	14.3
Israel 79	3.6	1.7	1.1	1.0	0.8	8.1
86	4.2	1.8	1.5	1.4	0.8	9.6
92	4.2	2.0	1.5	1.1	0.8	9.7
Italy 86	7.5	5.7	0.6	-0.3	-0.4	13.1
91	6.5	6.2	0.7	0.0	-0.3	13.0
95	6.4	6.4	2.1	0.2	-0.5	14.5
Luxembourg 85	9.7	3.8	0.7	0.2	-0.5	13.8

91	8.6	4.7	0.6	0.3	-0.5	13.6
94	8.8	5.4	1.0	0.6	-0.3	15.5
Netherlands 83	5.7	6.9	3.7	0.5	-0.3	16.4
87	7.1	6.8	2.6	0.7	-0.1	17.1
91	5.1	5.2	1.9	0.3	0.0	12.5
94	6.1	4.6	1.3	-0.2	-0.9	10.9
Norway 79	7.0	4.5	1.3	0.2	-0.3	12.7
86	6.5	3.7	1.0	0.2	-0.1	11.3
91	6.0	3.9	1.8	0.7	0.2	12.6
95	5.8	4.9	2.5	1.0	0.0	14.3
Poland 86	7.9	2.0	0.2	-0.2	-0.5	9.3
92	7.6	3.5	1.3	0.3	-0.2	12.5
95	9.9	7.2	3.8	1.9	0.7	23.5
ROC Taiwan 81	0.1	0.1	0.1	0.1	0.0	0.3
86	0.1	0.1	0.1	0.1	0.1	0.4
91	0.3	0.1	0.1	0.1	0.1	0.6
95	0.7	0.3	0.2	0.2	0.1	1.4
Russia 92	4.3	2.1	0.9	0.6	0.3	8.3
95	4.7	2.5	1.9	1.1	0.7	11.0
Slovak Republic 92	9.9	4.1	2.3	1.2	0.3	17.9
Spain 80	7.8	1.9	0.5	-0.1	-0.5	9.6
90	7.8	3.6	1.2	0.2	-0.4	12.4
Sweden 67	2.9	4.7	1.8	0.9	0.5	10.9
75	7.2	5.9	2.4	0.9	0.2	16.6
81	8.3	7.4	4.2	1.2	0.0	21.2
87	8.4	7.1	3.6	1.3	0.0	20.4
92	7.5	6.9	5.1	2.4	0.6	22.5
95	7.4	6.1	4.7	2.8	0.8	21.7
Switzerland 82	3.7	1.5	0.6	-0.1	0.0	5.7
U.K. 69	4.5	1.2	0.5	0.3	0.1	6.7
74	3.8	1.6	0.7	0.2	0.0	6.3
79	5.3	4.0	1.4	0.5	0.0	11.2
86	5.2	5.1	3.4	1.3	0.3	15.3
91	4.2	4.0	2.3	1.0	0.2	11.8
95	4.5	4.3	3.1	1.5	0.4	13.7
U.S.A. 74	3.4	2.0	0.9	0.5	0.2	7.1
79	3.3	2.1	1.4	0.8	0.6	8.1
86	3.1	1.9	1.3	0.9	0.4	7.6
91	3.2	2.2	1.5	1.0	0.6	8.4
94	3.1	2.2	1.5	1.0	0.6	8.6
97	3.2	2.1	1.4	0.9	0.6	8.2
Mean	5.7	4.0	1.9	0.7	0.1	12.4
St. Deviation	2.4	2.1	1.4	0.6	0.4	5.4

Annex Table 3						
	GAIN IN SHARES (in percent; using factor P income)					
Countries, years	first	Second	third	fourth	fifth	Five deciles (cumul)
Australia 81	2.8	1.4	0.8	0.7	0.3	6.0
85	2.6	1.4	1.0	0.8	0.4	6.2
89	3.3	1.8	1.0	0.6	0.3	7.1
94	3.4	2.5	1.3	0.7	0.3	8.3
Belgium 85	3.7	1.1	0.7	0.3	-0.1	5.8
88	3.9	1.2	0.6	0.2	0.0	5.9
92	3.9	1.9	1.3	0.9	0.7	8.8
Canada 75	1.8	1.0	0.7	0.5	0.3	4.3
81	1.7	1.0	0.7	0.4	0.4	4.2
87	2.1	1.1	0.8	0.7	0.4	5.2
91	2.6	1.5	1.0	0.7	0.5	6.3
94	2.8	1.6	1.0	0.8	0.5	6.8
Czech Republic 92	2.7	1.4	0.8	0.6	0.5	6.1
Denmark 87	7.6	2.6	1.5	0.6	0.0	12.3
92	5.7	3.0	1.9	1.0	0.3	11.9
Finland 87	2.5	1.7	1.3	1.0	0.6	7.1
91	2.7	1.8	1.4	0.9	0.5	7.3
95	4.4	2.4	1.8	1.3	0.8	10.6
France 79	1.6	1.4	1.0	0.7	0.5	5.3
81	2.1	1.2	0.8	0.6	0.2	4.9
84	1.6	1.5	1.1	0.8	0.5	5.6
France (b) 89	2.3	1.5	1.0	0.7	0.4	6.0
W. Germany 73	5.8	2.7	0.3	-0.2	-0.4	8.3
78	1.2	0.6	0.5	0.4	0.3	3.1
81	2.6	1.0	0.8	0.5	0.5	5.5
83	1.8	0.7	0.5	0.4	0.3	3.8
84	2.0	0.8	0.9	0.6	0.4	4.7
89	1.7	1.0	0.7	0.7	0.7	4.9
94	2.5	1.2	0.9	0.7	0.7	5.9
Hungary 91	2.9	2.0	1.6	0.7	0.2	7.3
Ireland 87	4.3	3.7	2.3	1.1	0.4	11.8
Israel 79	2.2	1.1	1.0	0.9	0.7	5.9
86	2.4	1.5	1.2	0.9	0.8	6.8
92	3.0	1.6	1.2	1.0	0.7	7.4
Italy 86	0.5	0.1	0.0	0.1	0.0	0.7
91	0.9	0.1	0.1	0.0	0.0	1.2
95	1.1	0.5	0.2	0.1	0.0	1.8
Luxembourg 85	3.0	0.6	0.2	0.1	-0.1	3.8

91	2.2	0.6	0.4	0.0	0.0	3.2
94	2.4	0.8	0.5	0.2	0.1	4.0
Netherlands 83	4.9	2.4	1.1	0.5	0.0	8.9
87	6.9	2.2	0.6	0.6	0.2	10.6
91	4.4	1.6	0.6	0.3	0.1	7.0
94	4.8	1.4	0.1	0.1	0.0	6.4
Norway 79	7.0	4.5	1.3	0.2	-0.3	12.7
86	6.5	3.7	1.0	0.2	-0.1	11.3
91	3.3	1.3	0.9	0.7	0.3	6.4
95	3.8	1.7	1.0	0.6	0.3	7.4
Poland 86	2.9	0.5	0.2	0.1	0.0	3.7
92	0.9	0.6	0.3	0.1	0.1	2.0
95	5.7	2.3	1.4	0.9	0.2	10.6
ROC Taiwan 81	0.1	0.1	0.1	0.1	0.0	0.3
86	0.1	0.1	0.1	0.1	0.1	0.4
91	0.2	0.1	0.1	0.1	0.1	0.5
95	0.4	0.1	0.1	0.1	0.1	0.8
Russia 92	0.5	0.3	0.3	0.3	0.1	1.5
95	0.2	0.3	0.2	0.2	0.1	1.0
Slovak Republic 92	3.8	2.1	1.3	0.7	0.3	8.1
Spain 80	7.8	1.9	0.5	-0.1	-0.5	9.6
90	2.5	0.6	0.3	0.0	0.0	3.3
Sweden 67	0.7	1.3	1.2	1.1	0.9	5.2
75	2.7	2.1	1.7	1.1	0.9	8.4
81	3.7	1.8	1.6	1.1	0.9	9.1
87	2.9	1.9	1.4	1.1	0.5	7.8
92	4.3	2.5	1.7	0.9	0.2	9.6
95	4.9	2.9	2.3	1.4	0.4	11.9
Switzerland 82	0.9	0.4	0.3	0.2	0.3	2.1
U.K. 69	1.7	0.6	0.5	0.4	0.3	3.4
74	1.2	0.7	0.5	0.3	0.2	2.9
79	3.0	1.3	1.2	0.7	0.3	6.6
86	4.2	2.5	1.5	1.3	0.5	10.0
91	3.6	1.9	1.2	0.6	0.2	7.5
95	3.8	2.9	1.6	0.8	0.3	9.5
U.S.A. 74	1.2	0.8	0.6	0.5	0.3	3.4
79	1.9	1.1	0.8	0.7	0.6	5.1
86	1.3	0.8	0.7	0.6	0.5	3.9
91	1.5	1.0	0.8	0.7	0.5	4.4
94	1.4	0.9	0.8	0.7	0.6	4.4
97	1.2	0.9	0.7	0.6	0.6	4.1
Mean	2.8	1.4	0.9	0.6	0.3	6.0
St. Deviation	1.8	0.9	0.5	0.4	0.3	3.1

Annex Table 4						
Factor income shares (in percent)						
Countries, years	Bottom decile	Second	Third	Fourth	fifth	5deciles
Australia 81	0.1	1.7	4.3	6.0	7.5	19.5
85	0.1	1.6	4.1	5.7	7.2	18.7
89	0.0	1.4	3.8	5.6	7.2	17.9
94	-0.5	0.5	2.9	5.2	7.3	15.5
Belgium 85	-0.1	0.0	0.0	4.6	7.7	12.1
88	0.0	0.0	4.3	4.3	7.3	15.9
92	0.0	0.0	2.1	5.7	7.9	15.6
Canada 75	0.2	2.6	4.6	6.2	7.6	21.3
81	0.4	2.8	4.7	6.2	7.6	21.7
87	0.4	2.6	4.5	6.0	7.4	20.9
91	0.2	2.3	4.3	5.8	7.4	20.0
94	0.1	1.9	4.0	5.7	7.3	18.9
Czech Republic 92	0.0	1.7	4.7	6.6	8.2	21.2
Denmark 87	-0.3	1.4	4.3	6.6	8.5	20.5
92	-0.3	0.8	3.5	6.1	8.2	18.4
Finland 87	1.5	3.8	5.5	6.9	8.2	25.9
91	1.5	3.9	5.5	6.8	8.1	25.7
95	0.7	3.0	4.7	6.2	7.6	22.2
France 79	-0.2	1.6	3.6	5.2	6.8	17.0
81	0.8	3.5	4.8	6.2	7.6	22.8
84	-0.4	1.2	3.4	5.0	6.6	15.9
France (b) 89	0.0	0.5	2.7	4.9	6.8	14.8
W. Germany 73	0.5	3.4	5.4	6.7	7.9	23.9
78	0.4	2.5	5.0	6.4	7.7	22.0
81	0.0	2.1	4.8	6.3	7.8	21.0
83	0.5	2.7	4.9	6.3	7.7	22.1
84	0.0	0.7	3.9	6.0	7.6	18.3
89	0.0	1.2	4.2	6.1	7.5	19.1
94	0.0	0.8	3.3	5.5	7.2	16.9
Hungary 91	0.0	0.6	2.7	5.3	7.2	15.9
Ireland 87	-0.4	0.4	2.4	4.5	6.4	13.4
Israel 79	0.7	2.4	3.7	5.0	6.6	18.5
86	0.2	2.0	3.4	4.8	6.4	16.9
92	0.2	2.2	3.7	5.0	6.5	17.7
Italy 86	0.0	1.3	4.3	6.2	7.7	19.5
91	0.1	1.6	4.7	6.2	7.8	20.5
95	-0.5	0.9	3.2	5.4	7.1	16.2
Luxembourg 85	0.0	2.7	5.1	6.6	8.0	22.5
91	0.1	2.6	5.3	6.6	8.1	22.7
94	0.0	2.1	4.8	6.3	7.7	21.0
Netherlands 83	0.0	0.5	3.4	5.9	7.3	17.0

87	0.0	0.7	3.8	5.7	7.1	17.4
91	0.0	1.5	4.4	6.1	7.3	19.3
94	0.0	2.0	4.7	6.2	7.5	20.4
Norway 79	-0.1	2.3	5.0	6.6	7.9	21.7
86	0.4	2.9	5.4	7.0	8.3	23.9
91	0.5	2.7	5.0	6.5	7.9	22.5
95	0.3	2.0	4.4	6.3	7.8	20.8
Poland 86	0.2	3.0	5.3	6.8	8.3	23.6
92	0.2	2.1	4.2	5.8	7.4	19.6
95	-2.1	0.2	1.8	4.1	6.2	10.3
ROC Taiwan 81	3.7	5.0	6.0	6.9	7.8	29.5
86	3.7	5.1	6.0	6.9	7.9	29.7
91	3.5	5.0	6.0	6.9	7.9	29.2
95	3.3	4.8	5.8	6.8	7.8	28.5
Russia 92	-0.2	1.0	2.9	4.5	6.1	14.3
95	0.0	0.3	1.4	3.1	5.1	9.8
Slovak Republic 92	0.0	2.2	4.6	6.5	8.1	21.4
Spain 80	0.0	2.0	4.3	6.1	7.6	20.1
90	0.0	1.7	4.3	6.2	7.7	19.8
Sweden 67	0.0	0.8	4.0	6.1	7.6	18.5
75	0.0	1.5	4.2	6.1	7.8	19.6
81	-0.1	1.4	3.7	6.0	7.7	18.6
87	0.0	1.2	3.3	5.7	7.6	17.9
92	-0.3	0.9	2.4	4.9	7.1	15.1
95	0.0	1.3	2.8	4.9	6.9	15.9
Switzerland 82	0.9	3.2	4.6	5.6	6.9	21.3
U.K. 69	0.8	3.5	4.8	5.8	7.0	21.9
74	1.4	3.5	5.2	6.5	7.7	24.3
79	0.1	1.9	4.5	6.2	7.8	20.4
86	-0.2	0.4	2.5	5.0	7.0	14.8
91	0.0	0.6	2.8	4.9	6.8	15.2
95	0.0	0.3	2.0	4.5	6.7	13.5
U.S.A. 74	0.0	2.2	4.2	5.8	7.2	19.4
79	0.1	2.2	4.1	5.7	7.3	19.4
86	0.1	1.8	3.7	5.4	6.9	17.9
91	0.1	1.7	3.5	5.1	6.8	17.2
94	0.0	1.4	3.1	4.8	6.4	15.7
97	0.1	1.7	3.3	4.8	6.3	16.1
Mean	0.3	1.9	4.0	5.8	7.4	19.4
St. Deviation	0.9	1.2	1.1	0.8	0.6	4.0

Annex Table 5						
Shares in factor P income (in percent)						
Countries, years	Bottom decile	second	third	Fourth	fifth	5deciles
Australia 81	0.6	3.3	5.0	6.1	7.4	22.4
85	0.6	3.3	4.8	5.8	7.1	21.7
89	0.3	2.7	4.5	5.8	7.1	20.3
94	-0.4	1.7	4.0	5.7	7.2	18.1
Belgium 85	1.1	4.5	6.0	7.3	8.6	27.5
88	1.0	4.5	6.0	7.3	8.6	27.4
92	0.8	3.8	5.5	6.8	8.0	24.9
Canada 75	0.9	3.5	5.1	6.3	7.6	23.3
81	1.1	3.7	5.2	6.4	7.5	23.9
87	1.0	3.6	5.1	6.3	7.5	23.5
91	0.8	3.3	5.0	6.3	7.5	22.9
94	0.6	3.1	4.9	6.3	7.5	22.4
Czech Republic 92	3.0	5.3	6.6	7.5	8.4	30.7
Denmark 87	0.5	3.9	5.4	6.9	8.3	25.0
92	0.0	3.2	5.4	6.7	8.2	23.5
Finland 87	2.6	4.7	5.9	7.0	8.2	28.5
91	2.4	4.6	5.9	6.9	8.1	27.9
95	1.1	3.7	5.3	6.5	7.7	24.3
France 79	1.4	3.3	4.6	5.9	7.2	22.4
81	1.2	3.6	4.9	6.3	7.7	23.7
84	1.2	3.3	4.6	5.9	7.3	22.2
France (b) 89	0.8	3.3	4.8	6.2	7.6	22.6
W. Germany 73	0.6	3.4	5.4	6.7	7.9	24.0
78	3.0	4.8	5.8	6.7	7.7	28.1
81	2.3	4.6	5.8	6.7	7.7	27.2
83	2.7	4.7	5.8	6.7	7.8	27.7
84	2.2	4.5	5.6	6.7	7.8	26.8
89	2.3	4.5	5.7	6.6	7.7	26.8
94	1.3	4.0	5.4	6.5	7.5	24.6
Hungary 91	0.9	3.5	5.4	6.8	8.1	24.7
Ireland 87	-0.4	0.8	3.1	4.9	6.7	15.1
Israel 79	1.4	3.0	4.0	5.2	6.7	20.2
86	0.8	2.6	3.8	5.2	6.6	18.9
92	0.7	2.7	4.0	5.3	6.7	19.4
Italy 86	2.6	4.6	5.7	6.8	7.8	27.5
91	2.5	4.6	5.8	6.9	8.1	27.8
95	1.1	3.7	5.0	6.3	7.7	23.9
Luxembourg 85	2.2	4.8	6.0	7.1	8.2	28.4
91	2.6	4.8	6.0	7.3	8.2	28.9
94	2.4	4.6	5.8	7.1	8.3	28.1
Netherlands 83	0.0	2.6	5.0	6.3	7.4	21.2

87	0.0	2.7	5.0	6.2	7.4	21.4
91	0.2	3.6	5.4	6.4	7.5	23.2
94	0.4	3.9	5.4	6.5	7.6	23.9
Norway 79	-0.1	2.3	5.0	6.6	7.9	21.7
86	0.4	2.9	5.4	7.0	8.3	23.9
91	2.1	4.6	5.8	6.9	8.0	27.4
95	1.4	4.3	5.7	6.8	7.9	26.2
Poland 86	1.8	4.6	5.9	7.2	8.4	27.9
92	2.1	4.1	5.4	6.6	7.9	26.0
95	-2.1	2.0	4.0	5.7	7.3	16.9
ROC Taiwan 81	3.7	5.0	6.0	6.9	7.8	29.5
86	3.7	5.1	6.0	6.9	7.9	29.7
91	3.6	5.0	6.0	6.9	7.8	29.3
95	3.5	5.0	5.9	6.8	7.8	29.0
Russia 92	1.1	3.2	4.2	5.3	6.5	20.2
95	0.4	2.2	3.8	5.3	6.5	18.2
Slovak Republic 92	2.0	4.7	6.2	7.5	8.7	29.0
Spain 80	0.0	2.0	4.3	6.1	7.6	20.1
90	1.4	4.1	5.6	6.7	7.8	25.6
Sweden 67	0.1	3.2	5.1	6.4	7.6	22.4
75	2.4	4.4	5.3	6.5	7.7	26.3
81	2.0	4.7	5.8	6.9	8.0	27.5
87	2.0	4.6	5.8	6.9	8.1	27.3
92	0.7	3.6	5.3	6.7	8.1	24.4
95	0.4	3.0	5.0	6.5	7.9	23.0
Switzerland 82	2.4	4.1	5.0	5.9	7.0	24.4
U.K. 69	1.9	4.0	5.1	6.1	7.1	24.2
74	2.7	4.6	5.7	6.6	7.7	27.2
79	1.2	4.1	5.3	6.4	7.6	24.6
86	-0.2	2.0	4.5	5.8	7.2	19.3
91	0.0	2.2	4.1	5.4	7.0	18.8
95	0.0	1.1	3.7	5.3	6.9	17.1
U.S.A. 74	0.8	3.3	4.8	6.1	7.3	22.3
79	0.6	3.0	4.6	6.0	7.4	21.5
86	0.6	2.7	4.3	5.7	7.1	20.5
91	0.5	2.6	4.1	5.6	7.1	19.9
94	0.4	2.3	3.9	5.3	6.7	18.6
97	0.7	2.6	3.9	5.2	6.5	19.0
Mean	1.2	3.6	5.1	6.4	7.6	24.0
St. Deviation	1.1	1.0	0.7	0.6	0.5	3.6

Annex Table 6				
Shares and sharegains of the middle class				
Countries, years	Shares of 5 and 6 decile in factor income	Share gain	Share of 5 and 6 decile in factor P income	Share gain
Australia 81	41.5	-6.7	40.5	-4.4
85	40.1	-6.0	39.3	-4.0
89	40.3	-6.7	39.7	-5.1
94	41.0	-7.4	40.4	-5.5
Belgium 85	44.5	-12.1	46.1	-5.8
88	42.4	-8.3	45.9	-5.8
92	44.2	-7.1	43.8	-2.5
Canada 75	41.9	-5.5	41.5	-4.7
81	41.7	-5.6	41.3	-4.5
87	41.0	-5.1	41.1	-3.9
91	40.9	-4.7	41.1	-3.5
94	40.8	-4.8	41.2	-3.5
Czech Republic 92	44.7	-6.3	44.0	-1.5
Denmark 87	46.3	-7.4	44.8	-5.4
92	45.4	-5.5	44.4	-4.0
Finland 87	44.4	-3.4	43.9	-2.0
91	43.9	-3.1	43.6	-2.5
95	41.8	-1.8	42.0	-1.4
France 79	38.2	-5.4	39.3	-3.5
81	42.5	-6.5	42.5	-5.7
84	37.9	-5.1	39.9	-3.7
France (b) 89	39.1	-6.3	41.2	-4.0
W. Germany 73	42.6	-7.6	42.5	-7.5
78	42.0	-7.0	41.3	-3.2
81	42.5	-6.8	41.6	-3.0
83	42.2	-6.9	41.8	-3.6
84	42.0	-9.3	41.9	-3.1
89	41.5	-7.8	41.2	-1.9
94	40.2	-6.2	40.8	-2.3
Hungary 91	40.0	-2.4	43.7	-4.1
Ireland 87	37.0	-5.5	38.2	-5.3
Israel 79	37.9	-4.3	38.0	-4.4
86	36.5	-3.0	37.1	-3.3
92	37.0	-3.2	37.4	-3.5
Italy 86	42.5	-9.7	42.6	-5.9
91	42.5	-8.1	43.3	-5.9
95	40.0	-9.5	42.0	-6.7
Luxembourg 85	43.9	-8.0	44.1	-5.9
91	44.1	-8.0	44.0	-5.3
94	42.7	-6.9	44.5	-5.2

Netherlands 83	40.0	-6.7	40.2	-5.0
87	39.7	-5.9	40.4	-4.1
91	40.3	-6.1	40.8	-4.8
94	41.4	-9.7	41.3	-5.7
Norway 79	43.0	-7.0	43.0	-7.0
86	44.9	-6.4	44.9	-6.4
91	43.4	-5.3	43.1	-3.5
95	43.0	-5.2	42.8	-3.7
Poland 86	45.3	-9.3	45.0	-6.0
92	41.0	-7.9	42.9	-6.2
95	36.4	-4.0	40.9	-5.7
ROC Taiwan 81	41.8	-4.6	41.8	-4.6
86	41.9	-4.6	41.9	-4.6
91	41.9	-4.7	41.8	-4.6
95	41.7	-4.7	41.9	-4.9
Russia 92	34.7	-5.9	35.8	-5.4
95	30.4	-5.5	35.9	-5.6
Slovak Republic 92	44.5	-4.2	46.1	-3.3
Spain 80	41.7	-8.7	41.7	-8.7
90	42.2	-8.0	42.4	-6.1
Sweden 67	41.8	-4.1	41.2	-1.3
75	43.0	-5.6	41.7	-1.5
81	43.2	-5.8	43.4	-1.1
87	42.8	-6.1	43.6	-2.3
92	40.8	-3.4	44.0	-4.5
95	39.8	-1.3	43.6	-3.0
Switzerland 82	38.0	-6.9	37.9	-4.4
U.K. 69	38.2	-5.0	38.3	-3.9
74	41.9	-5.8	41.2	-4.1
79	42.8	-6.6	41.6	-4.0
86	40.0	-6.0	40.1	-3.2
91	38.9	-6.6	39.1	-6.1
95	38.5	-6.0	39.2	-5.8
U.S.A. 74	40.3	-6.0	40.2	-4.8
79	40.5	-4.6	40.6	-4.0
86	39.0	-5.2	39.4	-4.5
91	38.8	-4.9	39.5	-5.0
94	36.6	-4.5	37.6	-4.6
97	35.6	-4.2	36.4	-4.1
Mean	41.0	-6.0	41.5	-4.4
St. Deviation	2.7	1.9	2.3	1.5

Notes: Deciles are formed according to factor or factor P income. The first decile, (e.g.) consists of the 10 percent of people with lowest household per capita income. The share gain is defined as the change in the share of *these* people as income concept changes from factor (or factor P) income to disposable income.

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